American Druggist

Vol. XVII. No. 2. NEW YORK, FEBRUARY, 1888. Whole No. 164.

Emulsions.

BY A. W. GERRARD, F.C.S.

TWENTY-FIVE years ago, in the early days of my pupilage, I can well remember the rough and ready rule of thumb methods that often prevailed when an emulsion had to be made, also the thick gruel-like magmas or thin greasy stuff produced. Happily there has been a change for the better, and pharmacists now recognize that to make satisfactory emulsions certain rules must be observed as to quantities and careful attention given to the process.

The most generally useful and important emulsifying agents at our disposal are the gums of acacia and tragacanth, used either as a powder or mucilage, preferably I think, as powder; of less value, but still having some special qualities to recommend them, should be mentioned yolk of egg and the tinctures of quillaia and senega. Milk is an emulsion formed by nature, and closely allied to milk in character is the emulsion made by rubbing almonds with water; both of these, though providing the highest types of what emulsions should be, are certainly not good emulsifying agents, for they possess no more power to emulsify than does a well-made diluted emulsion of any fixed oil. It is the habit of some dispensers to speak of the solutions of potash, soda, and ammonia as emulsifying agents. The cases are very few indeed where they really act as such; for when we combine alkalies with an oil or resin, they form soaps or semisoaps, so that their action is chemical, whereas a true emulsion owes its condition to physical influences. The alkalies have, however, some small power to emulsify, for I have often noticed that when they are shaken with chloroform or ether in the presence of vegetable extractive an emulsion has formed; its character, however, is weak, as separation usually takes place in twenty-four hours.

There are a few remarkable examples of emulsification happening daily in pharmaceutical practice, to which hitherto little or no attention has been paid, although it seems almost impossible they can have been overlooked. Most dispensers, when making an ointment with vaseline, must have observed the change of color the vaseline undergoes, and how opaque it becomes on stirring; the explanation of this is, that an emulsion of air has been formed. The peculiar viscosity of the vaseline and the motion of the spatula causes imprisonment of air, which soon becomes distributed in an extremely fine state of division. The statement here made is easy to prove, and can be demonstrated by the following experiment: Dilute some spirit of wine with water until a piece of vaseline just sinks in the liquid, now take a fresh portion of vaseline, then stir it well to get the air taken up, place it also in the liquid, it will be seen to float. The difference in the behavior of the two portions is caused by their different gravities, one portion holding air in suspension. Under similar treatment it will be found that most unctuous bodies emulsify air. What influence emulsified air has upon the keeping properties of fats and oinments would form an interesting subject for research. It is worthy of remark that two at least of the official ointments cannot be properly made without containing emulsified air; these are the ointments of red oxide of mercury and of boric acid. Unless they are continuously stirred while cooling they set to hard masses; stirring causes them to take up air, the air by its presence giving the ointments a finely granular soft and smooth consistence.

Emulsification of water is a common operation of pharmacy, cold cream manufacture provides an example; it is well known that the white, soft, creamy unctuousness of that article depends almost entirely on the water it holds in suspension. Butter is sometimes adulterated by being made to contain emulsified water. If we desire to incorporate an aqueous extract with a fat, it is usual to thin the extract with water, then emulsionize with the fat. The value of lanolin as an ointment base largely depends upon its containing emulsified water: the water has a softening influence on the lanolin, rendering it pliant and easy to mix; without water its consistence would be much too stiff for a good ointment base.

Emulsions prepared from the same kind of ingredients are frequently seen to differ in appearance and stability. The product of one operator is pure white, of another whitish-brown; its consistency is thick or thin; it may either separate in a few hours, or remain permanent for weeks. Differences of this kind can be accounted for by two causes, one natural, depending upon variations in drugs, due to soil, climate, period of collection, or changes effected by age; the other mechanical, in which the operator is usually at fault; for instance, the order of mixing may be varied, stirring in one case having been more vigorous or prolonged than in another, or dilution may have been effected with varying rapidity. Of the causes of variation alluded to, these which are natural are mainly outside the pharmist's control; the best and most he can do is to select good fresh drugs, taking care they are well preserved from atmospheric and other influences. Differences due to the mechanical steps of a process we may regard as entirely under control; they are faults either of judgment or of bad manipulation. Measuring oil in a watery measure should be avoided; likewise the use of a damp or warm mortar. It is a bad practice to leave off stirring whilst an emulsion is forming; when formed a little extra stirring is often advantageous. Never starve an emulsion by trying to be economical with the gum; the result is invariably a weak product, soon breaking down, or may be an utter failure, and however much you may try to coax it into form with more gum the result is commonly unsatisfactory. Overdoses of gum are almost as bad as deficiencies; you risk getting a thick magma flowing with difficulty, whereas good emulsions flow quite easily. For the patient, it is certainly far more pleasant to get a dose that flows easily down the throat, rather than one which hangs about the fauces and nauseates quite as much as the raw oil would.

A phenomenon commonly observed during the progress of making a gum emulsion, is a cracking noise, like the breaking of a small stick; this is due to the tearing action of the pestle, causing a series of fractures in the product. It has been asserted by many authorities that this click or cracking is positive evidence that the emulsion is a success. In my experience the sign is not infallible, for on numerous occasions students have shown me their products, with plenty of crack on stirring, but in such a spoilt condition that there was not the remotest hope of turning them into emulsions.

During the past fifteen years several contributions on emulsions have appeared in the *Pharmaceutical Journal*, and in the "Year Book of Pharmacy," chiefly the contributions of American pharmacists, to whom we are indebted for many useful hints and formulæ on emulsions. Having repeated some of the experiments of the authors, it was thought the results obtained might be a useful addition to these notes. R. Rother, *Pharm. Journ.*, May 11th, 1872, in a thoughtful paper says, "A perfect artificial emulsion is physically identical with the natural, that is as far as the extinction of the oil is concerned, and this peculiarity is the distinctive feature of an emulsion." There is one statement in the paper open to criticism, where the author says: "A concentrated perfect emulsion is in itself the most rapid and efficient emulsifier, possessing the property of emulsifying oil to an almost unlimited extent." The fault to be found with this statement is, that it creates an impression that a perfect emulsion can be utilized for the preparation of other emulsions, thus placing at our disposal an easy means of emulsification, besides economizing gum; such, however, is not the case, as the following experiment is intended to show: Eighty grains of powdered gum, half an ounce of castor oil, and three drachms of water were converted into a perfect emulsion. A further quantity of oil was added, and found, as stated by Rother, to be easily emulsified, or it would be more correct to say combined. Further it was found that dilution of the product with oil could be carried to an apparently unlimited extent. Though this experiment is interesting, its practical value is small, for as one would theoretically expect, it is found the excess of oil quite changes the character of the product; it no longer admits of dilution with water like an ordinary emulsion, but is changed to a magma, floating in and repulsing water, as if it were oil only. This change of character is due to the fact of the product being no longer, as Rother implies, an emulsion of oil, but an emulsion of mucilage; the oil being in excess constitutes the menstruum in which particles of mucilage are evenly distributed. The conditions of the case are analogous to those where ether dissolves water, and water dissolves ether. The knowledge to be gathered from the experiment is that, under certain conditions, mucilage will emulsify oil; on the other hand, oil being in excess, it emulsifies the mucilage, one product admitting of dilution with water, the other dilution with oil.

Another communication to which I would draw attention is by E. Gregory, "Year-Book of Pharmacy," 1887. The author discusses the question whether mucilage or powder of acacia gives the best emulsions; the conclusion being that the use of mucilage should be abandoned in favor of powdered gum. Gregory states that three drachms of powdered gum will emulsify one ounce of any of the volatile oils, but rather less (about 2 drachms) will answer for the fixed oils and balsams. The author's method of procedure is to mix the gum first with the oil, and, if the above quantities be used, neither more nor less

than four and a half drachms of water all added at once. The method was tested upon one ounce each of the following fixed and volatile oils: castor, cod-liver, olive, almond, turpentine, eucalyptus, peppermint, and sandal wood. The result in each case was as follows: The fixed oils all gave exceptionally good emulsions, white and as perfect as could be desired. Cod-liver oil during the process became very pasty, but that condition did not in any way interfere with dilution or final completeness. Oil of turpentine was a failure, but on slowly adding two drachms more water than Gregory indicates, it gave a creamy emulsion. Oil of eucalyptus failed, and like turpentine took two drachms more water to recover it; the product was then imperfect. Oil of peppermint turned out fairly well, but a little more water improved it. Sandal wood oil gave a beautifully white and perfect emulsion, which I attribute to its having more body or viscosity than other volatile oils. Gregory's process was further applied to creasote, carbolic acid, copaiba, balsam of Peru, and extract of male fern. All of these gave excellent emulsions, those of creasote, carbolic acid, and copaiba, after resting a month, appearing as perfect as on the day they were made; the male fern and Peru formed creamy layers, which a gentle shake easily distributed. Taken as a whole, Gregory's process is as good as any examined; the only improvement I can suggest is that, when dealing with volatile oils, each ounce requires 3 drachms of powdered gum and at least 6 drachms of water.

P. H. Dilg (*Amer. Journ. Pharm.*, 1878) approves of powdered gum for emulsions, 4 drachms of which should be added to 8 drachms of oil, then 8 drachms of water in one volume. The rule the author attempts to establish is, that 2 parts of oil need 1 part each of gum and water. A trial of the formula, whilst giving good emulsions, turned them out much too thick; the gum is really in excess of what is needed, a 33-per-cent castor oil emulsion flowing with difficulty. On economical grounds Gregory's formula is preferable, giving better emulsions with one-third less gum.

Notwithstanding that the balance of opinion is greatly in favor of acacia over tragacanth for the production of emulsions, yet there are still those who hold to tragacanth and continue to recommend it; this is matter for surprise, for the more fully we know the perfect character of acacia emulsions, the more completely do those made with tragacanth pass into the shade. Tragacanth gives magmas rather than emulsions; you can easily enough combine and suspend oils with it, but examine the product, and you will plainly see that the oil globules are generally of a coarse character, distinctly visible to the unaided eye. Further, tragacanth emulsions lack that milk-like fluidity, pure whiteness, and capacity for easy dilution, so characteristic of acacia emulsions. The difference obtainable by the two gums may reasonably be attributed to their difference of constitution. In a tragacanth emulsion the swollen colloid bassorin appears to have the power of keeping the globules of oil from coalescing, not by virtue of its viscosity, but rather by providing an obstacle to the movement of the oil. On the other hand, in a perfect acacia emulsion each particle of oil is no doubt surrounded by an envelope of perfectly soluble gum, both together forming a cell, having enough resistance to prevent coalesence with contiguous cells. At this point I am constrained to make a few remarks on the cod-liver emulsion of the Unofficial Formulary made, as you know, with tragacanth. Like Conroy, my attempt to make a good emulsion of it was a failure. The oil is well incorporated and suspended, but badly divided; however well it may be shaken it shows, on inversion, oil globules flowing down the bottle side in a state of division that certainly would not satisfy a fair critic. It would have been better, as Conroy suggests, to have made it with gum acacia.

Tinctures of senega and quillaia possess remarkable properties as temporary emulsifying agents, remarkable because of their power, in very small quantity, to divide and pulverize substances when gums fail. If you place in a bottle 1 ounce of chloroform, 20 minims of tincture of senega, and a few drachms of water, then shake them well, and make up to 5 ounces with water, you get a product in which the chloroform is seen to be divided into an immense number of globules; these globules do not remain long suspended; they readily subside, but will rest together for hours without coalescence. After a day or two a portion of chloroform is found broken down. Mercury, ether, or essential oils can be divided in the same manner; a singular feature about the mercury is that it succeeds best when gently shaken, violent agitation restores it to its original form. Mr. H. Collier, of Guy's Hospital, "Year-Book of Pharmacy," 1879, give some formulæ for senega-made emulsions. These I find are very useful for hospital work, where, as a rule, the time allowed for the work done is much too brief; but in private dispensing, senega will never be regarded with much favor, on account of the temporary character of its products.

The flavoring and preservation of emulsion is a branch of the subject which certainly ought not to be overlooked. Although an emulsion may be therapeutically and mechanically perfect, it often is nauseating to the taste and offensive in odor. Flavoring, though only an adjunct, therefore of minor importance, still does contribute elements of value to a medicine. The pharmacist has a great variety of flavors at his command; his chief difficulty perhaps is to select the one which would give most general satisfaction. The common favorites among flavors are those used in cookery, such as the volatile oils of almond, cinnamon, cassia, cloves, lemon, the essence of vanilla, and orange-flower water. My own opinion of these, as regards permanency, palatability, and power to disguise, is in favor of essential oil of almonds, used in the proportion of 1 minim to each ounce of oil emulsified. An elegant cod-liver oil emulsion, in which taste and odor are well masked, is made as follows:

Take of:

Cod-liver Oil	4 ounces.
Powdered Gum Acacia	1 ounce.
Oil of Cassia	4 minims.
Oil of Almonds	4 minims.
Saccharin	2 grains.
Water to make	8 ounces.

Mix the oils with the gum and saccharin in a dry mortar, add 2 ounces of water in one volume, stirring till the emulsion is formed; finally, add sufficient water to make 8 ounces.

Castor oil is very well disguised in the following formula:

Take of:

Castor Oil	1 ounce.
Powdered Gum Acacia	3 drachms.
Essential Oil of Almonds	2 minims.
Oil of Cloves	1 minim.
Saccharin	1 grain.
Water to make	4 ounces.

Mix the oils with the gum and saccharin in a dry mortar; add 4 drachms of water at once, stirring till the emulsion is formed; dilute to 4 ounces with water.

My experience with yolk of egg emulsions has been very limited, but singularly, whilst writing these notes, a prescription for a cod-liver oil and egg emulsion was presented me to dispense. The ingredients for each dose were cod-liver oil, 1 drachm; yolk of egg, ½ a drachm; water to 1 ounce; no flavoring of any kind. It made up very well; the order of mixing was to gradually pour the oil on to the yolk of egg, with constant stirring, then dilute with water; on transference to a bottle a vigorous shake improved it. The dose 1 ounce, containing 1 drachm of oil, being for a child, seemed to me unduly diluted, and wanting in finish, so after a few experiments the following improved formula was arranged:

Take of:

Cod-liver Oil	4 ounces.
Yolk of Egg	2 "
Common Salt	25 grains.
Saccharin	2 "
Oil of Cloves	8 minims.
Water to make	8 ounces.

Rub the oils gradually with the yolk of egg, salt and saccharin, till an emulsion is formed, make up to 8 ounces with water and shake well.

The product is a thin, but most perfect emulsion, which can be flavored with any desired aromatic in place of cloves. Such a combination seems admirable in many ways; its taste is very mild, the nutritious value of the oil is enhanced by the yolk of egg, and the emulsion can be made by the merest tyro without risk of failure.

Having saccharin at our disposal, it provides us with a useful substitute for sugar in emulsions. Its advantages are that it adds nothing to the thickness of the product, and cannot give rise to fermentation. The method found most convenient for using saccharin, is a 10-per-cent solution, made by rubbing the saccharin smooth with a little water, then adding bicarbonate of sodium till effervescence ceases; 20 grains of the saccharin takes 8 grains of the soda salt. The product is a neutral saccharin salt of soda, freely soluble in water and easily miscible with neutral or alkaline fluids, but giving a precipitate of saccharin with acid solutions.

Salt is occasionally taken for masking the taste of cod-liver oil; it combines well with oil in emulsions. The taste of the oil is well covered, especially if a little oil of clove be added in addition to salt. No argument is needed to justify such a combination, as it forms a salted animal food; moreover, the salt is admirably adapted to keep the oil sweet and free from rancidity.

To keep emulsions for long periods is not desirable. They are best freshly made. Should it be desired to preserve them, recourse must be had to such antiseptics as boric or salicylic acid, or better perhaps a simple tincture of benzoin, or even pure chloroform. The latter is a most powerful antiseptic, imparting an agreeable sweetness; one minim may be added to each ounce of emulsion.

The last four or five years, it has been noticed as a growing practice among medical men and others, to call all preparations holding finely divided suspended matter emulsions. It is a common occurrence in my pharmacy

to be asked to prepare an emulsion of boric acid, salicylic acid, or iodoform, in olive oil or glycerin. If it is correct to apply the word emulsion to such preparations, then we may extend its meaning to all examples of uniform suspension, so that a bismuth or rhubarb mixture becomes an emulsion. This widening of the meaning of the word is, in my opinion, perfectly legitimate, and even consistent with our own practice. When we emulsify a solid resin, as copaiba or benzoin, our whole aim is to get the solid finely divided and evenly distributed ; this accomplished, the product is called an emulsion. Therefore it is reasonable enough to argue that the suspension and equal distribution of any finely divided solid in a soft or liquid medium equally constitutes an emulsion. It does not matter whether benzoin or bismuth be suspended, the mechanical conditions are precisely the same. . . .

In conclusion, I wish to acknowledge the assistance of Mr. C. Collingwood Fenwick in conducting the experiments which this paper involved.

Mr. Joseph Ince, in discussing the foregoing paper, said : The chief merit of the paper was the direct practical experiments which controlled the more theoretical portion. Referring to some of the transatlantic methods which had been mentioned, he thought that the style of American pharmaceutical journalism was more to be deprecated than American pharmacists, as too much stress and importance was placed upon the single experiments of one man. Thus, a recent American writer said a good and perfect emulsion would stand heat, and gave this as a distinguishing test. He could not point out too strongly that this was not a true test, as only age and durability could distinguish a perfect from an imperfect emulsion ; moreover, his experience invariably showed that emulsions, however well made, would inevitably separate on the least application of heat. For that reason the least heat, even mechanical, in performing the operation should be avoided. There were three principal methods by which emulsions could be made. First, mucilage of acacia : this unquestionably was the easiest and most fitted for the tyro. Second, powdered gum : this, the continental method, required more experience and dexterity. Third, the instantaneous mixing of oil, gum, and water together, by no means so easy as the other methods, but undoubtedly superior when it could be done. He confirmed Mr. Gerrard's experience that the gum acacia at the present day was distinctly inferior to that in use several years ago, for he now found it almost impossible to keep it in the form of mucilage for a week and sometimes not more than three days. The value of senega as an emulsifying agent, he considered, had been much overrated, although convenient for rapid emulsifying ; but, in his experience, the emulsion thus made would not keep even an hour. Quillaia, as far as he was aware, was not used to any extent in English pharmacy, although it had found much favor in America.

Mr. H. Collier (Guy's Hospital) thought that the name emulsion should be strictly confined to the minute division and suspension of fixed and volatile oils, balsams, and oleoresins. For this purpose he knew of nothing so good as quillaia or senega. He exhibited an emulsion of mercury made eight years ago with tincture of senega, which he considered perfectly emulsified, for the globules were divided as in gray powder. Chloroform might also be quickly emulsified in the same manner, and, if left for a considerable time, would not separate. If it were thought necessary that an emulsifying agent should add viscosity, so as to keep permanently for a very great length of time, senega and quillaia fail. This feature, however, he did not consider essential, and he knew of many instances where taking a viscous emulsion was thought to be as bad as taking the oil itself, whereas emulsions made with senega were very fluid and totally unlike the oil. Besides, the great advantage was that instant agitation would produce the emulsion, and this in hospital dispensing (although no pains were spared when necessary) was of great importance. He firmly maintained the exceptional value of senega, although willing to admit its deficiency in adding viscosity and permanency.—*Pharm. Journ.*

Camille-Jean-Marie Mehu died on November 29th, in Paris, aged 52. Deceased was born at Dijon (Côte d'Or), in Burgundy, and graduated as pharmacist of the first class in 1862, at the Paris College, and in 1865 as doctor of medicine at the Paris Faculty. In 1862, he was appointed the pharmacist-in-chief to the Necker Hospital, a post he filled for some nineteen years, when he was transferred, in the same capacity, to the Charité Hospital. He was, in 1880, elected a member of the Academy of Medicine for the section of pharmacy, and, in 1881, represented it, as well as the Paris Pharmaceutical Society, as their delegate to the London International Pharmaceutical Congress. He was an honorary member of many pharmaceutical societies, including those of Chicago, Philadelphia, etc., and, finally, last May he was elected an honorary member of the Pharmaceutical Society of Great Britain.

NEW FORM OF PERCOLATOR.

E. G. Perry, of Birmingham, England, suggests a modification of the form of percolator, which differs from that directed by the U. S. Pharmacopœia in two particulars—the one, and the most important, consisting in its being longer in proportion to its diameter. The U. S. P. percolator is more conical than Mr. Toogood's, and has a depth, three and a half times the diameter at the top, while Mr. Toogood's has a depth five times its larger diameter. This is a decided advantage [?], inasmuch as the higher the column of material and menstruum in proportion to their bulk, the more complete is the exhaustion with the same quantity of menstruum. The other difference between the new percolator and the U. S. P. one is in the construction of the stem. In the U. S. P. percolator, this is narrowest at its extremity, and the cork which is fitted in the neck has to be inserted from the inside; Mr. Toogood's percolator has a regular bottle neck, in which the cork can be inserted in the ordinary way. This, though apparently a small matter, is a source of much comfort practically. The percolator is made in the following sizes: 12 oz., 25 oz., 66 oz., 100 oz., and 160 oz.—*Chem. and Drugg.*

[Our British contemporary is not the first to suggest this form of percolator, Prof. Oscar Oldberg having preceded him by three or four years and percolators of this form being made already by Whitall, Tatum & Co.—Ed. Am. Druggist.]

A NEW EXTRACTION APPARATUS.

O. Foerster recommends the form of apparatus devised by him and here illustrated. It consists of four parts :

1. A receiver of the form *A*, in which the solution of the dissolved matter is finally freed from the volatile solvent by heat.

2. A tube *B*, about 3 Cm. wide, and 19 Cm. long to the contracted portion. The latter is carefully ground so as to fit air-tight into the neck of the receiver *A*.

3. The extraction tube proper. This is about 22 Mm. wide, and 150 Mm. long to the contracted portion. The latter is long enough to reach down into the receiver *A*, and is obliquely cut off at the end. It fits quite loosely into the tube *B*, and its exterior is provided with some knob-like projections to permit the free passage upwards of the vapors of the volatile solvent. This tube is charged with the material to be extracted, which is confined in it by means of two loose tampons of perfectly purified cotton, at the bottom and at the top of the contents.

4. The condenser *D*, of the form shown in the cut. It is made entirely of glass, and ground at its lower part so as to fit air-tight into the mouth of the tube *B*.

The use of the apparatus is easily intelligible without further details. — After *Zeitsch. f. Anal. Chem.*, 1888, 30.

Practical Hints about Aluminium.

Aluminium is at the present time made in such quantities, and so cheap that its technical use will become greatly extended. It has, however, some peculiarities which must be known or understood to render experiment with it, or its practical use, successful.

When aluminium is to be melted, to make a casting, for instance, this must not be done in clay crucibles, since it reduces the silica contained therein to silicium, whereby it becomes gray and brittle. It must be melted in lime crucibles ; or if clay crucibles are used, they must be lined with carbon, or, well-ignited cryolite. Graphite crucibles, however, are the best.

A good solder for aluminium is made by melting together 5 parts of zinc, 2 parts of tin, and 1 part of lead, and rolling this out into thin sheets. The aluminium surface to be soldered must be scraped clear of all oxide, and coated with paraffin. A piece of the solder is then placed upon each portion and heated. This causes the paraffin to melt ; on further heating, the solder melts and unites with the aluminium. The two surfaces thus coated are then soldered together in the usual manner.

Utilization of Waste Products.*

MR. ALFRED H. ALLEN, the President of the Society of Public Analysts, of England, lately delivered the following interesting address upon a very practical subject:

Dirt has been cleverly defined as "matter in the wrong place." Similarly, we may define waste as "a valuable product, the use of which remains unknown."

In almost all manufactures we find the production of the primary article attended with the formation of one or more secondary products which it is the natural aim of the technologist to utilize. Thus, in the manufacture of iron from the ore, we get slag and combustible gases as secondary products.

Sometimes the secondary product becomes, through a change in commercial conditions, the primary aim of the manufacturer, the article for which the product was first conducted occupying the second place. A remarkable instance of this occurs in the manufacture of soda by the Leblanc process. The first stage in its manufacture consists in treating common salt with sulphuric acid. There is thus obtained sulphate of soda, which is the primary product, and is ultimately converted into the more serviceable forms of caustic soda and carbonate of soda, while, at the same time, there is produced a large quantity of hydrochloric acid in the form of gas. This, formerly, had but a limited application, and was allowed to escape in the neighborhood of the alkali works, many of which were situated at St. Helen's and Widnes in Lancashire, with the result that the vegetation for miles round suffered most severely. Under the first Alkali Act, manufacturers were compelled to condense 95 per cent of this hydrochloric acid. This, at first, was regarded as practically an impossible feat, but it was found by passing the gas up a tower filled with coke, down which a stream of water was allowed to trickle, that condensation could be readily effected. Alkali inspectors were appointed to see that the Act was properly carried out, and the arrangements soon became so perfect that, instead of merely complying with the Act, and condensing 95 per cent of the acid gas, the condensation of 99 per cent became common. It became necessary, however, to find some outlet for the liquid hydrochloric acid which was produced by the condensation, and this soon became utilized for the production of chlorine, which itself was absorbed by slaked lime to form the ordinary chloride of lime or bleaching powder. The manufacture of chlorine from hydrochloric acid was conducted by heating the latter with a mineral known as black oxide of manganese, an article which is familiar to Sheffield steel-melters. The secondary product of the reaction was a very acid liquid containing chloride of manganese, which, from its corrosive character, proved very objectionable when run into drains or rivers. By the genius and industry of the late Mr. Walter Weldon, the manganese in this secondary product was recovered, and a perfectly neutral and harmless effluent produced. The result was an enormous saving in the cost of producing chlorine, and a consequent impetus to the manufacture of chloride of lime, which is employed in very large quantities, not merely as a disinfectant, but for bleaching cotton and linen; its manufacture is, in fact, at the present time, one of the great industries of the country. Meanwhile, the sulphate of soda, which I have already referred to as the primary object of the treatment of common salt with sulphuric acid, has become of less value than formerly, owing to the competition of the so-called "ammonia process" of manufacturing soda carried out at the works of Messrs. Brunner, Mond & Co., at Northwich. This process runs the Leblanc method of soda manufacture so hard that the latter may now be said to be struggling for its existence, and the profit on the manufacture of soda by it has practically disappeared. But the ammonia process does not result in the production of hydrochloric acid, nor consequently of chlorine or chloride of lime, and as chloride of lime is required in such enormous quantities, it has become the primary object of the alkali manufacturer, who may now with greater propriety be called an "acid manufacturer," his principal raw product being the hydrochloric acid which he used to send up his chimney-stacks because he thought it too much trouble and too expensive to condense it.

The utilization of the waste products from the manufacture of coal-gas is one of the most curious chapters in the history of chemistry. Thus, when coal is distilled there are obtained, as primary products, illuminating gas, coke, tar, and ammoniacal liquor. The quality of these products largely depends on the temperature and other conditions under which the distillation is conducted. Thus, when coal is distilled primarily for the purpose of producing illuminating gas, as in our ordinary gas-works, the coke is of inferior quality, while the tar is superior. For many years it was a matter of regret with technologists that no successful attempts had been made to utilize the waste gas and tar produced when coke was the primary object of the manufacture, as in coke-ovens. Now, however, this is successfully done, but the tar produced varies greatly in character, according to the special kind of coke-oven, that from the Simon-Carvé ovens being very similar to ordinary gas-works tar, while that from the Jameson and other coke ovens is of very little value.

Every one is familiar with the general fact that gas-works tar is now the raw material from which countless products are obtained, remarkable for their color, their medicinal value, and other useful applications. These products have been actually created by the chemist. Many of them have no existence in the animal or vegetable world, while others which have a natural existence, as, for instance, benzoic acid in gum-benzoin, can now be produced from coal-tar by synthetical means at a mere fraction of the cost of the natural product. The same thing is true of alizarin, which is the basis of the so-called Turkey-red dye, so familiar to all of us. The production of alizarin from coal-tar has resulted in the entire abandonment of the cultivation of madder, the natural source of alizarin, and the same may any month happen to the culture of indigo, a coloring matter which can now be produced in a state of purity from coal-tar, but not, so far, at a price which will enable it to compete successfully with the natural product. For some purposes, however, the artificial indigo is found more convenient, and hence already receives a somewhat limited application.

Similarly, there have been recently made from coal-tar a number of bodies remarkable for their antipyretic and antifebrile characters, and more than one of the active principles of plants known as alkaloids have been synthetically prepared; in fact, the artificial production of quinine itself from coal-tar may now be regarded as fairly within the range of practical possibilities. The cochineal industry is another which is threatened with extinction by the production of the azo-scarlets from coal-tar, though these bodies are very different chemically from the coloring matter of the cochineal insect.

The production from coal-tar of the intensely sweet substance called saccharin is another instance of the creation of a new product likely to have an extensive practical application, and that in cases in which sugar is unsuitable.

There is a curious mistake which has occurred so frequently when non-scientific persons have been in conversation with me that I feel it will not be out of place to refer to it on this occasion. Continually we have the iridescence observed on a pool of water where tar has been spilt regarded as a practical illustration of the existence of brilliant coloring matters, and people seem to think that these exist ready-formed in the tar. Of course the iridescence in question is purely an optical effect, due to the same cause as the brilliant hues of the soap-bubble, and can be produced by any film which is sufficiently thin. A drop of colorless oil of turpentine on the surface of a dinner plate of inky water will show the colors as brilliantly as the soap-bubble or the pool of tarry water.

As a matter of fact, all the known constituents of coal-tar, with very few exceptions, are colorless bodies. The black color itself is probably due to free carbon, and when the tar is distilled the fresh distillates have but little color. It is true that certain fractions are known as "red oils" and "green oils," but a little coloring matter goes a long way in such cases.

It is as much a mistake to suppose that the aniline dyes and other colored substances derivable from coal-tar exist ready-formed in the crude material, as it would be to look for ready-made cakes of scented toilet soap in a cocoanut or a live sheep.

People often are inclined to ridicule the long names given by chemists to the products of the laboratory, but in defence it must be remembered that these products of organic synthesis are so numerous that casual names would be perfectly useless, and hence names which to any competent chemist are descriptive of their nature, origin, and general properties, are absolute necessities. The scientific name of a synthetic organic substance may be compared to a placard bearing the full name of a man, together with his occupation and address, his titles of honor, and very often whether he is strong in his attachments, is right or left handed, and looks with both eyes in the same direction, to say nothing of giving the names and occupations of his parents and ancestors, and the number, ages, and dispositions of his children. It is no exaggeration to say that the full systematic names of many chemical substances are capable of affording to the chemist, conversant with that particular branch of the subject, an amount of information comparable with the case just supposed.

To take a simple example of a not very complex kind, there is a certain artificial coloring matter commercially called "Helianthin." It dyes silk a fiery orange hue, and is used by chemists in place of litmus to indicate the point of neutrality. The trade name of helianthin or "Orange III.," indicates nothing of the nature of the substance, though otherwise convenient. Now the systematic chemical name of this body is ammonium dimethylamidoazobenzenesulphonate.

This name, which at first strikes one as ludicrously long, is really descriptive of the nature and origin of the

---

*A paper read before the Sheffield Literary and Philosophical Society.

substance. Thus, expressing the elements carbon, hydrogen, nitrogen, oxygen, and sulphur by their initial letters, we find that the name of the substance indicates it to have the following descent.

The name benzene is applied by chemists to a hydrocarbon composed of six atoms of carbon and six of hydrogen, expressed by the formula, C_6H_6 or $C_6H_5.H$.

Azobenzene signifies benzene in which one atom of hydrogen has been replaced by nitrogen (azote) thus:—$C_6H_5.N$, or preferably doubled, $C_6H_5.N:N.C_6H_5$.

Amidoazobenzene will be azobenzene in which one atom of hydrogen is replaced by the group NH_2, called amidogen. Methylamidoazobenzene will be a body in which one of the hydrogen atoms of the amidogen are replaced by the group methyl, CH_3, and the dimethyl derivative one in which both such hydrogen atoms are replaced. A sulphonic acid is a body in which the group SO_3H replaces a hydrogen atom, and a sulphonate is a salt of such acid. Ammonium salts contain the compound group, NH_4, which plays the part of a metal and hence can replace hydrogen in an acid. Now, with this general explanation it becomes easy to trace from its name the genealogical descent of ammonium dimethylamidoazobenzenesulphonate, thus:—

1. Benzene — $C_6H_5.H$
2. Azobenzene — $C_6H_5.N:N.C_6H_5$.
3. Amidoazobenzene — $C_6H_5.N:N.C_6H_4.N\begin{cases}H\\H\end{cases}$
4. Dimethylamidoazobenzene — $C_6H_5.N:N.C_6H_4.N\begin{cases}CH_3\\CH_3\end{cases}$
5. Dimethylamidoazobenzenesulphonic acid. — $\left.\begin{matrix}C_6H_4\\SO_3H\end{matrix}\right\}N:N.C_6H_4.N\begin{cases}CH_3\\CH_3\end{cases}$
6. Ammonium dimethylamidoazobenzenesulphonate. — $\left.\begin{matrix}C_6H_4\\SO_3(NH_4)\end{matrix}\right\}N:N.C_6H_4.N\begin{cases}CH_3\\CH_3\end{cases}$

By adding up the various atoms of carbon, hydrogen, etc., in the substance it will be found that the empirical formula of helianthin is $C_{14}H_{15}N_4O_3S$. But such a formula gives comparatively little information as to the nature of the substance. In fact, the empirical and constitutional formulæ are related to each other in much the same manner as are the commercial and systematic names of the substance.

Having the systematic name of the substance, and being thus able to plan out its constitutional formula, a chemist will find it a comparatively easy matter to devise methods for its formation; but without a knowledge of the constitution of a substance, he will be working in the dark, and will have but little chance of success. That is just the present position of the chemist with respect to albumin and and several allied bodies, which, in addition, are very difficult to purify, and have empirical formulæ of extreme complexity. It is evidently by studying the products of decomposition of a body that we can best attain such a knowledge of its constitution as will enable us successfully to essay its synthesis, as has been done with alizarin, indigo, salicylic and benzoic acids, oil of bitter almonds, and many other substances.

(To be continued.)

AN APPARATUS FOR PREPARING SULPHUROUS, CARBONIC, AND PHOSPHORIC ANHYDRIDES.

H. N. Warren describes the apparatus here illustrated as being very suitable for the preparation of anhydrous sulphurous, carbonic, and phosphoric acids.

It consists of a glass vessel *A*, provided with 3 tubulures, otherwise resembling a large Woulff's bottle, the large tube *B* being provided with a stopper for the purpose of introducing fresh material from time to time into the small dish *C*. *D* is a tube conveying a current of air to support the consumption of the combustible material, and the generated gas is carried off by the tube *E* to the vessel intended to receive it.

Supposing the apparatus is to be used for making anhydrous sulphurous acid. A piece of sulphur having been dropped down the central tube, it is ignited by touching it with a red-hot wire, and the stopper of the central tube is then inserted. A slight blast of air is maintained by means of bellows, connected with *D*, until the whole of the sulphur is thoroughly kindled, when a somewhat more powerful blast may be applied. When the apparatus is in full working order, from two to three pounds of carbonate of sodium may be converted into sulphite of sodium in less than half an hour, or several gallons of water may be saturated.

The author states that, by connecting the apparatus with a powerful refrigerator, a large quantity of liquid SO_2 has been obtained by him in a short time.

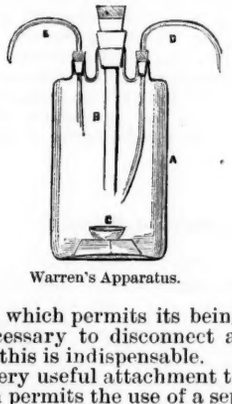
He also states that it will be found advantageous during the preparation of sulphurous anhydride to introduce a layer of water, about one inch in depth, into the generating vessel. [The cut shows the capsule *C* sufficiently elevated over the bottom to prevent its coming in actual contact with the water. If the capsule is of iron, such contact would, probably, be immaterial.]

Carbonic and phosphoric anhydrides may also be generated in this apparatus, by introducing slight modifications. But in the case of phosphorus, the air must be allowed to enter only gently, since a rapid current would invariably cause the fracture of the vessel.—After *Chem. News*, December 9th, 1887.

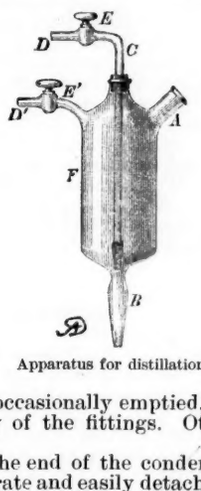
APPARATUS FOR DISTILLATION UNDER DIMINISHED PRESSURE.

Distillation under reduced pressure is an operation frequently employed in the chemical laboratory and in manufacturing establishments in operations on the large scale. But it will, no doubt, also become more generally used in the laboratory of the pharmacist, as it involves but little additional trouble or expense, and, moreover, permits a much larger amount of work to be done in a less time, and at a considerably lower temperature than when the usual plan of distillation is followed.

"Diminished pressure," of course, implies the use of some method by which air or vapor is exhausted. This may be accomplished either by an aspirator, or by means of one of the well-known filter pumps. The latter need only be connected, by means of suitable tubing, with the receiver, while the latter is connected air-tight with the condenser. If the receiver has a faucet or other arrangement which permits its being occasionally emptied, it is unnecessary to disconnect any of the fittings. Otherwise, this is indispensable.



Warren's Apparatus.



Apparatus for distillation.

A very useful attachment to the end of the condenser, which permits the use of a separate and easily detachable receiver, has been devised by Prof. L. Meyer, primarily for another purpose.

It consists of the glass vessel *F*, which is fitted to the end of the condenser by means of the neck *A*. Into its neck is fitted a glass tube *C*, passing through a soft cork, and just tight enough to permit the tube being raised or lowered without causing leakage. The lower end of the tube is ground so as to fit into the inner constriction of the neck. The outer surface of the neck *B* is also ground so as to fit air-tight into a series of interchangeable receivers. Both tubulures *E* and *E* are connected with the air-pump.

When the distillation is started, and the condenser, the vessel *F*, and the receiver are connected, the air or filter-pump is started, the tube *C* being drawn up far enough to permit the condensed liquid flowing at once into the receiver. When this is full, the tube *C* is pushed down, and whatever condensed liquid passes over now, collects in the vessel *F*. Meanwhile a new receiver is attached, and after a few minutes, when the air has been exhausted from it through the tube *C*, the latter is again raised, when the liquid already collected in *F*, and any that will subsequently pass over, will flow into the new receiver. The same manipulation may be repeated as often as necessary.—After *Zeitsch. f. Instrumentenkunde*, 1887, 440.

Co-operation among Swiss Pharmacists.—A number of pharmacists in Geneva have formed an association for the purchase of drugs in a wholesale way, and the common manufacture of pharmaceutical preparations, with a view of being better able to meet the increasingly severe competition to which they are subjected. The association further proposes to compete for the supply of medicines to friendly societies, charitable institutions, hospitals, the military and police departments, and other public bodies, at specially reduced prices. Ten Geneva pharmacists have so far joined the association.

Flexible Mucilage.—To 20 parts of alcohol add 1 part of salicylic acid, 3 parts of soft soap, and 3 parts of glycerin. Shake well, and then add a mucilage made of 93 parts of gum arabic and 180 parts of water. This is said to keep well, and to be thoroughly elastic.

Fluosilicate of Sodium as a Disinfectant.

MR. E. DAVIES lately read before the Liverpool Chemists' Association a paper containing the following statements:

The element, silicon, is in the mineral kingdom what carbon is in the organic. Being a tetrad and being able to join itself to other atoms of silicon, it can form compounds of great complexity; its oxide, silica, one of the most abundant minerals, is the anhydride of two acids, ortho- and metasilicic acids. Neither of these acids can be obtained pure, owing to the readiness with which each loses water, but the metasilicic is the more definite of the two. Its formula is H_2SiO_3, and if for the dyad, oxygen, we substitute the monad, fluorine, we get fluosilicic acid, H_2SiF_6.

This acid may be obtained by heating together silica, fluorspar, and sulphuric acid, and passing the tetrafluoride of silicon into water, when we get both fluosilicic and metasilicic acids. $3SiF_4 + 3H_2O = H_2SiO_3 + 2H_2SiF_6$. If the fluosilicic acid is then neutralized with sodium carbonate, if the acid is strong, most of the fluosilicate of sodium separates in minute crystals, which may be filtered off and dried.

Sodium fluosilicate is only slightly soluble in water, 1 part dissolving in 150 parts of water. The solution has a saline, not unpleasant taste; it is powerfully antiseptic and disinfectant. Meat immersed in a saturated solution of it remained perfectly sweet after four days at a temperature of 25° C., whilst similar meat in distilled water was disgustingly putrescent and swarmed with bacteria; no living organism was visible in the fluosilicate. Urine was also preserved for a similar time by the addition of one-fourth of its bulk of the solution.

As a disinfectant, its effects was shown by the addition of one-fourth of the bulk of the water from the putrescent meat above mentioned, from which it removed all unpleasant odor and destroyed the living organisms. It is stated to be innocuous to health, and it is therefore a valuable addition to the list of antiseptics and disinfectants.

Mr. W. Thomson, of the Royal Institution Laboratory, Manchester, is the discoverer of the properties of this substance, and has patented it under the name of salufer. —*Pharm. Journal and Trans.*

Varieties of Albumen in Urine.

THE forms of albumen met with in urine are:

(1). *Serum Albumin*, a substance which, according to Hammersten, constitutes 4.516 per cent of the blood serum. It is almost constantly present in urine which contains any variety of albumen. Although a less diffusible body than serum globulin it is capable of passing through membrane.—(2). *Serum Globulin* or Paraglobulin, the globulin of the blood serum, of which it constitutes 3.103 per cent. It is met with in almost all albuminous urines, its proportion to the serum albumen varying in different instances.—(3). *Peptone*, a product of gastric and pancreatic digestion of albuminous substances, also occurring in the process of transformation of tissues and of inflammatory effusions. It is a readily diffusible substance, occasionally met with in the urine in association with or apart from serum albumen.—(4). *Propeptone*, or Parapeptone, or Hemialbumose, a substance or group of substances intermediate between albumen and peptone, constituting a stage or stages of transformation from the one to the other. It is highly diffusible, and is occasionally met with in the urine under conditions corresponding to those under which peptone occurs.—(5). *Acid Albumen*, or Syntonin, one of the derived proteids obtained by the action of acids upon albumen. It is easily produced artificially by the addition of acid to albuminous urine, but may occur naturally in certain cases.—(6). *Alkali Albumen*, another derived proteid, produced by the action of alkalies upon albumen. It is readily produced artificially, but is also found naturally in the urine.—(7). *Hæmoglobin*, the combination of hæmatin and globulin naturally existing in the red corpuscles of the blood. It sometimes appears in the urine, particularly in cases of hæmaturia and hæmoglobinuria, also in certain septic conditions, and after inhalation of arseniuretted hydrogen, transfusion of blood, and otherwise.—(8). *Fibrin*, a proteid substance which does not normally exist as such in the blood. It is met with in the urine in hæmaturia, in some cases of chyluria, and in certain varieties of renal casts.—(9). *Mucin*, the chief constituent of mucus, is a derived proteid substance. It frequently becomes superadded to the urine after secretion, and may be derived from any part of the urinary tract. 10). *Lardacein*, *Waxy or Amyloid Material*, familiarly known as a pathological substance within the body, is said to be occasionally demonstrable in renal casts.

Of these ten varieties the last four are of little practical importance—mucin alone being indeed worthy of special comment, and that mainly because of the difficulties which its presence raises in regard to the reliability of certain tests for serum albumen.

The following are the tests for the albumens, put in tabular form,

TABLE SHOWING TESTS FOR THE CHIEF FORMS OF ALBUMEN.

	Serum Albumen.	Serum Globulin.	Peptones.	Propeptones.	Acid Albumen.	Alkali Albumen.
Heat	.....	....	....	....	....	0
Heat with nitric acid.	Opacity ..	Opacity ..	0	0	0	Opacity.
Heat with acetic acid.	Opacity ..	Opacity ..	0	Opacity dissolved by heat.	Opacity...	Opacity.
Cold, nitric acid	Opacity ..	Opacity ..	0	Opacity diminished or dissolved by heat.	0	Opacity.
Metaphosphoric acid.	Opacity ..	Opacity ..	Opacity diminished or dissolved by heat.	Opacity diminished or dissolved by heat.	Opacity...	Opacity.
Acidulated brine....	Opacity ..	Opacity ..	Opacity diminished or dissolved by heat.	Opacity dissolved by heat.	Opacity...	Opacity.
Picric acid.....	Opacity ..	Opacity ..	Opacity dissolved by heat.	Opacity dissolved by heat.	Opacity...	Opacity.
Potassio-mercuric iodide.	Opacity ..	Opacity ..	Opacity dissolved by heat.	Opacity dissolved by heat.	Opacity...	Opacity.
Potassium ferrocyanide.	Opacity ..	Opacity ..	0	Opacity dissolved by heat.	Opacity...	Opacity.
Dilution with water.	0	Slight opacity.	0	0	0	0
Magnesium sulph...	0	Opacity ..	0	0	Opacity...	Opacity.
Fehling's solution...	Brownish-red or mauve.	....	Rose pink or purple.	Rose pink or purple.		
Randolph's test.....	.....	....	Yellow opacity ..	Yellow opacity ..		

—*The Analyst.*

Synthesis of a Sugar.

THE announcement from Würzburg that Professor Fischer and Herr Tafel have succeeded in preparing artificially a compound possessing the properties and having the composition of a true sugar—in fact, differing from glucose chiefly, if not entirely, in its behavior towards polarized light—marks another important advance in the progress of organic chemistry. This synthesis is the outcome of a long series of researches which have been laid before the Berlin Chemical Society, and recorded in the *Berichte*, but its attainment probably first came within the range of perceptible possibilities during an investigation of the conditions attending the oxidation of polyatomic alcohols. Previously to this subject being taken up by Messrs. Fischer and Tafel, the products obtained as the result of such oxidation had with one exception, been acids, the probability being that the aldehydes or ketones first formed escaped observation through lack of suitable methods for their separation. The exception, mannite, yielded to Gorup-Besanez a sugar that was named mannitose, but which has since been proved, by its behavior towards phenylhydrazin, to be identical with lævulose. In consequence of this result, Messrs. Fischer and Tafel experimented upon other polyatomic alcohols; glycerin, erythrite, and dulcite being oxidized with nitric acid, and phenylhydrazin being used for the detection of the aldehyde or ketone. This was an application of an observation made previously by Professor Fischer, that the varieties of sugar which reduce alkaline copper solution form, with phenylhydrazin, crystalline compounds difficultly soluble in water and therefore easily isolated. The manner of formation of these compounds is represented by the following equation:

$$C_6H_{12}O_6 + 2C_6H_5.N_2H_2 = C_{18}H_{22}N_4O_4 + 2H_2O + 2H.$$

Each of the three products of oxidation mentioned yielded a hydrazin derivative which corresponded in composition, manner of formation, and properties, to compounds of phenylhydrazin with sugars. Glycerin, especially, yielded a beautiful crystalline product, having the composition $C_{18}H_{16}N_4O$, which seemed to have been formed, in all probability, from glycerin aldehyde ($CH_2OH.CHOH.COH$) or the isomeric ketone ($CH_2OH.CO.CH_2OH$), though it was not possible to isolate the aldehyde. It may be convenient to mention here that the term "phenylglycerosazon" has been applied to the glycerin derivative, the term being modified when applied specially to other derivatives, so as to indicate the origin of the compound.

In order to study more closely the origin of this glycerin compound, it was determined to attempt to prepare

glycerin aldehyde another way. To effect this, acrolein was treated with bromine to form bibromacrolein, which was found to be easily attacked by baryta water, with the result that the bromine was replaced by hydroxyl radicals, the product being a very soluble substance that energetically reduced Fehling's solution, and possessed all the properties of an aldehyd-alcohol. It having been suspected that a sugar might be formed in this way, a preliminary attempt was made to isolate such a product, if it existed, by means of phenylhydrazin, and this was so far successful that a substance of the osazon class was obtained, having the composition $C_{18}H_{22}N_4O_4$, and scarcely distinguishable from phenylglucosazon, the compound formed by glucose with the same reagent, except in being optically inactive. This result, at least, left little doubt that a sugar had been formed from the bibromacrolein under the influence of the baryta, and probably according to the following equation:

$$2C_3H_4Br_2O + 2Ba(OH)_2 = C_6H_{12}O_6 + 2BaBr_2.$$

The next difficulty, therefore, to be overcome was to regenerate the sugar from the hydrazin compound, to which the name "phenylacrosazon" has been given to indicate its origin from acrolein. It was then found, in the course of purifying the substance resulting from the combination of phenylhydrazin with the products of the decomposition of bibromacrolein, that two isomeric compounds were present, one of them insoluble in ether, the other soluble in the presence of resinous impurities, but nearly insoluble when pure, and these were designated respectively α-phenylacrosazon and β-phenylacrosazon. Some of the α-phenylacrosazon, which was the preponderant constituent, was submitted to the action of reducing agents, resulting in the formation of a base which, when analyzed as an oxalate, gave figures corresponding to the formula $(C_6H_{13}NO_5)_2C_2H_2O_4$. This base gave all the reactions of glucosamine; it reduced Fehling's solution vigorously when warmed, but it was optically inactive. The neutral oxalate dissolved in ice-cold water was then treated with a calculated quantity of sodium nitrite and a little oxalic acid, which caused the evolution of all the nitrogen from the base. After this reaction had finished, the liquid was exactly neutralized with soda solution, evaporated in a vacuum, and the residue extracted with alcohol, which left upon evaporation a sugar in the form of a light brown syrup, free from nitrogen or ash, having a sweet taste, reducing Fehling's solution very strongly, and combining with phenylhydrazin to reproduce phenylacrosazon. It has not yet been ascertained with certainty whether it is fermentable. In fact, the only point of difference yet observed between it and a natural sugar is that it is perfectly inactive towards polarized light.—*Pharm. Jour. and Trans.*

Commercial Cocaine.

THE editor of the *Chemist and Druggist* makes the following statement in one of the recent issues:

"There recently came under our notice a case in which a chemist had reported to a manufacturer that the cocaine hydrochlorate made by the latter was impure. The manufacturer averred, however, that the hydrochlorate conformed to Maclagan's test, giving a 'perfectly clear solution with ammonia,' and this he took as a proof that the salt was free from amorphous alkaloid. Our attention was called to the matter, and we find that another manufacturer in Germany has reproduced the test in the following form:

"'To 0.1 gramme hydrochlorate of cocaine, dissolved in 100 grammes of distilled water, 5 drops of liquor ammonia Ph. B. are added. The solution should remain perfectly bright. (McLagan's [*sic*] test.)'

"There is no mention here, it will be seen, of the separation of cocaine hydrate, on the addition of ammonia, and it is rather a strange fact that, on testing the product of this manufacturer, we find it not to conform with his own test, but to the original one. We have tested other samples, and find that two of German origin quite responded to the modified test above quoted, affording no precipitate, one of them only giving a faint milkiness. Three other specimens gave immediate precipitates with ammonia, which in a few seconds became crystalline, and, on subsiding, left the supernatant solution clear. These were therefore pure: the first two were not; but we may add that when, in the latter case, the volume of water was considerably decreased, a precipitate of an amorphous character was afforded. It is perfectly obvious that some manufacturers are working up to what they consider a standard of purity, which is really one of impurity. The result is that they produced a cocaine hydrochlorate which is very bulky, is in the form of micaceous scaly crystals, and dissolves readily in water. The pure hydrochlorate is much heavier and dissolves more slowly."

Urinal Cakes.—These are much used for the disinfection of urinals. One form of these is made by fusing together sulphates of copper, iron, zinc, alum, and soda, and moulding into cakes.

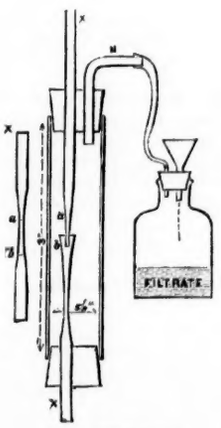
A SIMPLE FILTER PUMP.

A VERY simple and efficient filter pump may be made as follows: Select a piece of stout glass tube, 3 inches long, and $\frac{5}{8}$ inch bore; fit this with corks, one with two holes, and the other with one hole. Then take three pieces of ordinary glass tubing $\frac{1}{16}$ inch bore, and draw two of them out as shown in the left-hand figure, cut the one at *a*, and the other at *b*; bend the third piece at an angle of 90°. Insert the tube *x a*, and the bent piece through one cork, and *x b* through the other, so that *x a* will project inside of *x b*. Attach *x a* to a water-supply. On allowing water to run through the apparatus, a vacuum will be produced in the tube *N*, and, if connected as shown in the cut, filtering will proceed rapidly. The apparatus gives a vacuum of 28.5 inches of mercury.—ROBERT LAW, in *Chem. News*, December 9th, 1887.

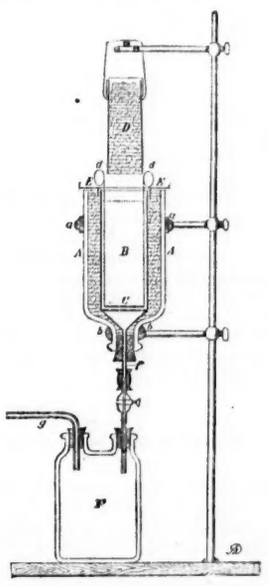
APPARATUS FOR SEPARATING LIQUID AND SOLIDIFIED CONSTITUENTS, BY MEANS OF COLD.

IN the course of an investigation on certain organic compounds of antimony, A. Michaelis and U. Genzken encountered the problem how to separate a liquid mixture, consisting of two substances, one of which is solid, the other liquid at ordinary temperatures, into its two component portions. Mere cooling and pouring off the liquid portion, even when several times repeated, was insufficient, in the special case under consideration, to accomplish the object.

Success was finally attained by using the apparatus here described, which has some resemblance to that proposed some sixteen years ago by Koerner and Louguinine,* but



Law's Filter-pump.



Apparatus for separating liquids by cold.

which the authors have considerably improved. This apparatus is likely to be serviceable for the preparation of many other substances, requiring separation from accompanying liquids. [*Note by Ed. Am. Dr.*—It seems to be specially useful for the separation of solid stearoptens from volatile oils, or of the more solid fatty acids from the more liquid ones, etc., etc. The authors had no occasion to use a large apparatus. We shall give the measurements just as they are in the original paper. For practical or manufacturing purposes, of course, the dimensions may be correspondingly increased.]

A is a glass-bottle without bottom, about 10 inches high and 5 inches in diameter. The neck of this bottle carries a perforated rubber-stopper, through which a small leaden tube *f* passes, which is connected, by a funnel-shaped piece, with the cylinder *B* constructed of tinned iron. This cylinder has a diameter of about 3 inches. It is open at the top, and is adjusted at such a height that its rim is at the same level with the rim of the bottle. *E* is a tinned iron ring, projecting beyond the rim of the bottle, and intended to keep the open space between cylinder and bottle snugly covered. The cylinder has a perforated bottom or diaphragm at the bottom, immediately over the conical attachment.

C is an additional perforated, but loose bottom which may be lifted out or let down by means of two wires with handles (*d d*) attacked.

D is a water-tight cylinder of tinned iron, $2\frac{1}{4}$ inches in diameter, about 6 inches high, and provided with a handle and a well-fitting lid.

* According to Louguinine (Ber. Deutsch. Chem. Ges., 4, 514), first described by Koerner in a memoir entitled: "Sul luoso chimico nelle sostanze aromatiche."

The leaden tube *f* is connected, with interposition of a glass stop-cock, with one neck of a Woulff's bottle, while the other neck is connected with an aspirator, or pump.

The manner of using the apparatus is as follows:

A freezing mixture is prepared by mixing comminuted ice and salt (which easily accomplishes a fall of temperature as low as — 15° C. (5° F.), and the space between the bottle *A* and the cylinder *B* completely filled with it. The ring *E* is now put on, and the diaphragm *C* let down to the bottom of the cylinder. The stop cock below *f* having been closed, enough of the liquid which is to be operated upon is poured into the inner cylinder to fill it about three-quarters full. Next the cylinder *D*, previously also filled with the above-mentioned freezing mixture, is cautiously let down into the apparatus, so as to just dip into the liquid, and the whole arrangement then left to itself for a time, in a room which should be as cold as possible.

In the special case for which the authors employed the apparatus, half an hour was sufficient to accomplish the purpose. It had then become a pasty mass. The time required, and the condition of the mass, under other circumstances, will of course vary considerably, but no difficulty will be encountered in adjusting the process for any special purpose.

When the crystallization or solidification of the solid constituent appears to have proceeded as far as possible, the stop-cock is opened, and the mass compressed, first gently, then more strongly, by the cylinder *D* being slowly pushed down. At the same time, the aspirator or pump, connected with *g*, is started, so as to withdraw the liquid portion as rapidly as possible. When this is accomplished, the cylinder *D* is withdrawn, and the solidified contents removed by lifting out the extra diaphragm *C*.

[This process may, of course, be repeated once or more times, when the object is to obtain as much as possible of the liquid and of the solid constituent separately. In the experiment conducted by the authors, the main object was to obtain a certain quantity of the solid constituent. No attempt was, therefore, made to deprive the liquid portion of the small quantity of solid still retained in solution.]

The last adhering traces of the liquid portion may, in most cases, probably be removed in the manner described by the authors, namely, packing the solidified mass between layers of blotting paper and subjecting it to strong pressure. The attempt to separate the solid from the liquid portion by pressure, while all or nearly all the liquid is still present, usually results in failure, since most or all of the solid matter will re-dissolve. But when only traces of the liquid accompany the solid, the loss of the latter, upon pressure, is insignificant, even when operating at the ordinary indoor temperature.—After *Liebig's Annal.*, 242, 164.

Mixture of Glycerin and Mucilage of Acacia.

WM. DUNCAN, in a paper published by the *Pharm. Jour. and Trans.*, says that his attention having been drawn by a friend to the fact that, when glycerin is added to mucilage, a jelly is formed, and asked if he could explain it. He is in the habit of using this mixture as an excipient for Blaud's pills, and had noticed that, if it be allowed to stand for any time before using, the mixture thickens, a sort of jelly-likebody being formed at the junction of the two liquids. Mr. Duncan then writes:

"Thinking that glycerin might be a precipitant of arabin, I at once jumped to th e conclusion that this was the explanation of the formation of the jelly, but on stirring together equal bulks of the two liquids in a glass measure, no separation of arabin took place. On the contrary, the mixture remained quite bright and fluid. This agrees with the statement in "Pharmacographia," "that mucilage mixes with glycerin and that the mixture may be evaporated to a jelly without any separation." I found, however, that if the glycerin be first measured out, and the mucilage be then run on to the surface of it, care being taken not to mix the two liquids, in about five minutes a jelly is formed at the junction of the two, which slowly falls to the bottom if the measure be allowed to remain undisturbed for a couple of hours. The jelly, after being slightly washed to rid it of adhering glycerin, was found to be readily soluble in water, and the solution gave precipitates with basic acetate of lead, alcohol, and ammonium oxalate, so that probably it is simply gum arabic. If the mixture be stirred, the jelly becomes redissolved and a clear solution results. This leads me to the following explanation of the reaction: The glycerin absorbs part of the water from the mucilage, and the gum, not having sufficient to keep it in solution, is precipitated in the form of a jelly. After a time, however, if the mixture be shaken, the glycerin and water begin to dissolve the precipitated gum, and we have then a clear solution. I believe this explanation to be the correct one, as I find that, if glycerin be first diluted with 25 per cent water, no separation takes place on the addition of the mucilage."

French Chemists' Assistants.

THE Paris correspondent of a London daily paper states that the Parisian *potards*, or chemists' assistants, are threatening to strike, or at least to take steps to protect themselves from what they call the "rapacity of their masters." The disaffection among the knights of the pestle and mortar is attracting public attention because it is well-nigh unprecedented. It opens up, in fact, a vista of contingencies as terrible as that shadowed forth by the chemist who was subpœnaed in the famous case of "Bardell *versus* Pickwick," and had left a small boy with hazy notions of the contents of the cabalistically marked drawers and bottles in his shop. At a recent meeting of the disaffected Parisian *potards*, it was stated that there were twelve hundred slaves who were condemned to pass their wretched existence behind a counter making up pills and potions, or in the laboratory preparing syrups and purgatives. They worked seventeen or eighteen hours in summer and sixteen in winter, and another ground of complaint was that, even when there were no customers, they had to make believe that they were doing something by dusting or arranging bottles and phials. For these reasons the ill-fated *potards* are trying to form themselves into a syndicate; but it is extremely doubtful if they will succeed, even should they form such an association, in ameliorating their lot, which is not a happy one. These men are the unlucky ones of the pharmaceutical profession, as they have no money to start in business for themselves, and they are thus forever condemned to what they call in common with the Socialists, the "exploitation of the capitalists." One of the men gave a melancholy description of the ordinary day's work of a Parisian chemist's assistant. He rises at 7 o'clock, and serves the ordinary morning customers who come for castor oil, sulphate of magnesia, *tisanes*, and other decoctions. At 10 he goes to the laboratory and makes up syrups, after which he returns to the shop and tries to take his lunch, in a hole between the laboratory and the office. While eating he is disturbed fifty times, and when he has finished, the hardest and most responsible work of the day begins. This consists in the making up of medicines from the doctors' prescriptions, which pour in endlessly. This work is done at a feverish rate, and continues up to 11 o'clock at night, when the wearied assistant ascends five flights of stairs to his garret. Even when in bed he is doomed to hear the frequent ring of a bell which summons him to the shop or laboratory in the small hours of the morning. To the chemists' assistants who have no money and no hope, this life is worse than slavery. By joining a syndicate they may obtain more salary, if they succeed in intimidating the employers, which is doubtful; but they can hardly expect to get more liberty or recreation, for even the masters themselves have to remain tied to their desks for long hours; the chemist who is in the habit of absenting himself from his place of business, or of spending too much time in cafés or similar places, being regarded by the customers as dangerous and untrustworthy.—*Chem. and Druggist.*

Loofahs.

THE loofah or towel gourd (*Luffa ægyptiaca*) is indigenous to Egypt and Arabia, but is grown extensively in Western Africa and the West Indies. The plant, a cucurbitaceous one, is a climbing vine which frequently attains a length of thirty feet. It is chiefly remarkable for its ovate fleshy fruit, of which it seldom bears more than a dozen, varying in length from six inches to two feet. This fruit in the fresh state is elliptical ovate, and has a green epidermis marked longitudinally with black lines. It is the close vascular network of this fruit, freed from the epidermis, pulp, and seeds, which forms the loofah, so familiar to chemists for a dozen years or more. The natives of the countries in which the towels gourds grow have long used them as scrubbing brushes and as strainers. To prepare them for these purposes the epidermis is removed, and the peeled fruit then thoroughly washed in water and beaten so as to remove the mucilaginous pulp and the seeds. Although loofahs have long been used by natives for washing purposes, we have heard it said that their introduction into this country for similar purposes was a mere accident. A consignment of them was received here, but no one knew what they were for. They ultimately got into the hands of a merchant as payment of debt, and be more than repaid himself by selling them as a sponge substitute for the bath. When the stock was exhausted several years elapsed before another supply was received; indeed, on this occasion they were placed on the market as a perfect novelty. The loofah is imported in the uncut state, our own wholesalers generally giving it the longitudinal incision which makes it a flat and serviceable flesh-brush. The gourd is also used for making fancy toilet articles, which are so highly thought of in the West Indies that a sample (a small basket) was sent to the Queen as a Jubilee present, and was shown in St. James's Palace. Recently the uses of the loofah have been greatly extended by a German manufacturer established at Halle on the Saale. He makes from them loofah soles, which have to a large

extent replaced those made of straw and felt. The loofah soles warm the feet in winter and cool them in summer, keeping them constantly dry. They are extremely elastic and easily washed with soap and water. Saddle undercloths are also made from loofahs, which have the virtue of preventing the animal from remaining wet under the saddle after sweating. But what may be considered the most important application of the loofah is in the manufacture of surgical bandage stuffs. Bandages made of this material are competing closely with the wood-wool kind, which were introduced some time ago. There are unquestionably other uses to which the loofah might be applied, and as enormous quantities are obtainable at a low rate (some bales were a year ago sold in London at the rate of five a penny), further applications are only a question of time. The seeds of the loofah contain fixed oil, but this in too small quantity (2.5 per cent) to pay for its extraction. The mucilaginous matter is so rich in bassorin that an infusion of the fruit becomes almost solid on cooling. A congener, *Luffa Bindaal*, is used in India medicinally as a remedy for carbuncle. For this purpose, an infusion of the fruit is used as a fomentation, which causes the slough to come out entire. There are other species which are possessed of medicinal properties. The two species, *L. purgans* and *L. drastica*—the fruits of which are known as American colocynth—possess powerful purgative properties, as might be expected of cucurbitaceous plants. Several are of a bitter character, *e.g.*, *L. echinata*, an Indian plant, the fruit-fibre of which, according to Dymock, is intensely bitter, and is used medicinally by the Hindoos. This loofah is quite a tiny fruit, being no larger than a nutmeg. As to the use of the ordinary loofah, we find that the uncut kind is much more lasting than the other, although as a flesh rubber it is not so effective as the interior surface.—*Chem. and Druggist.*

Tincture of Quillaia Bark.*

MR. PETER BOA says that, having had some experience in the use of quillaia bark for other than strictly medicinal purposes, I had long ago come to the conclusion that an aqueous menstruum was the most suitable for extracting its active constituents. I was therefore somewhat surprised to find that the formula given by the British Pharmaceutical Conference Committee directed the tincture to be made with rectified spirit. It is true that no dose is specified, and as the tincture for which the formula is given is used in the preparation of liquor picis carbonis, we may reasonably assume that this was the sole object for which the tincture was designed, and, if this be so, we can scarcely find fault with it, because for the purpose in question a rectified spirit tincture would be preferable to one less strong in alcohol. However, there is an increasing demand for tincture of quillaia for internal use; in Edinburgh this has been markedly so since the beginning of this year, when Dr. Claud Muirhead, in the *Edinburgh Medical Journal*, referred in commendatory terms to the administration of the drug in bronchitis, and there is just a possibility that the B. P. C. formula may be taken as a guide to the preparation of a tincture for this purpose. It would, I think, be a pity if it were so taken, because this tincture does not at all represent the virtues of the bark. I have looked up a number of references to quillaia, and I find that all the writers on the subject agree in the conclusion that water is the best solvent of saponin, which is regarded as the active principle of the bark. Gmelin says that saponin is easily soluble in water (1 in 4), more soluble in dilute than strong alcohol, insoluble in absolute alcohol.

Hager gives a formula for an infusion, and a tincture prepared with dilute alcohol.

Grazer, an American pharmacist, recommends for emulsifying purposes a tincture with 3 parts of water and 8 of rectified spirit.

Dr. Claud Muirhead has used with success a decoction.

Collier gives a formula (*Pharm. Journ.*, Sept. 20th, 1879) for emulsifying purposes with 4 oz. of bark to a pint of rectified spirit; this apparently is the formula copied into the B. P. C. formulary, but made with only half the quantity of bark.

For the purposes of this note I have prepared tinctures of various alcoholic strengths. I take three of these for comparison:

No. 1 is made according to the B. P. C. formula.

No. 2 is made with proof spirit.

No. 3 is made with 3 of rectified spirit and 4 of water.

The time at my disposal since agreeing to bring the subject before this meeting has not been sufficient to enable me to estimate the comparative values of these tinctures except in a somewhat rough and ready way, although I believe the results may be taken to be fairly trustworthy. The quantity of saponin in a tincture may be estimated comparatively by the amount of froth which it produces when shaken up with a quantity of water. Taking the three tinctures above-mentioned, adding ½ a drachm of each to 2 oz. of water in a 6-oz. bottle, and shaking, the following results were observed:

No. 1 gave of froth 1.

No. 2 gave of froth 1¾.

No. 3 gave of froth 2.

A percolate obtained by running a quantity of water, equal to half the quantity of the original tincture, through the marc from the B. P. C. formula, gave nearly as good results as No. 3, showing that the bark had not been exhausted by any means; a percolate obtained in the same way from the proof spirit tincture residue gave very little indication of value. I may say that preliminary mixtures with the water were made with spirit added to Nos. 2 and 3 to make them equal in alcoholic strength to No. 1, in case the spirit might affect the froth test. It was not found to affect the results, and has not been added to the specimens shown to illustrate the comparative frothing power. An emulsion made with No. 1 and a fixed oil separated more quickly than one prepared with No. 3. I hope, if time will permit, to determine more accurately the comparative values of these tinctures. However, I have no hesitation in concluding from the result of my experiments that a weak alcohol is preferable to a strong for making tincture of quillaia. In fact, I see no use for any alcohol except for preservative purposes.

The question arises: What should be the strength of the tincture? Dr. Muirhead says he gave ʒss. to ʒi. of tincture, but, unfortunately, he says nothing about the strength. He mentions, however, that the decoction, of which he gave a tablespoonful, was made with 5 of bark and 200 of water. A tincture of equivalent strength might therefore be made with 2 oz. to a pint. To make the tincture approximate in strength to senega tincture, 1 oz. to the pint would be more than enough.

There is just one point more to which I would allude. The B. P. C. formulary does not specify the part of quillaia bark to be used. Undoubtedly the white portion of the bark is the more valuable; the brown outer portion contains chiefly coloring matter. Both, however, are used together, for I have seen commercial specimens of tincture resembling in color tincture of orange peel. The specimens shown, made from the white portion, are, at most, pale straw color. In making liquor picis carbonis, color is of no consequence, and the quantity of bark ordered is greatly in excess of what the menstruum can exhaust, hence, presumably, the want of any specification on this point.—*Pharm. Journ.*

Note on Hydrobromic Acid.

MR. JOHN WILSON says: Some time ago my attention was drawn to some hydrobromic acid which had recently been received in stock, and which showed evident signs of decomposition.

A faint straw color was first observed, which gradually deepened, until it was an intense yellow.

A few preliminary tests showed abundance of free bromine, and the question became, "What is the cause of this unwelcome change?"

To answer this satisfactorily, it was necessary to know by which of the many different processes the solution had been made. It was labelled B. P., 1885, indicating that it had been prepared by decomposing sulphuretted hydrogen by means of bromine, distilling the hydrobromic acid formed, and making the distillate up to a specific gravity of 1.077 and a strength of 10%. The reaction which takes place is as follows:

$$10Br_2 + 4H_2S + 8H_2O = 20HBr + 2H_2SO_4 + S_2.$$

The solution is apt to be contaminated with free sulphuric acid if the distillation is carried too far, and it proved to be the case in this instance, for on the addition of a little barium chloride solution the white insoluble barium sulphate was formed.

At first it was thought that there must be other acids present to account for the decomposition, but no trace of either bromic, hydrochloric, or phosphoric acid was found after careful testing.

Light exercises a strong influence on hydrobromic acid, but in this instance it could not have been the disturbing agent, as the bottle was entirely excluded from direct sunlight, or even bright diffused sunlight. The action of sulphuric acid is something as follows:

$$2HBr + H_2SO_4 = Br_2 + 2H_2O + SO_2.$$

Sulphurous acid was specially looked for, but without success, so probably it was oxidized into sulphuric acid again, in presence of water and oxygen.

$$2SO_2 + 2H_2O + O_2 = 2H_2SO_4.$$

Oxygen is a potent agent in liberating bromine from its compounds, and in this case it no doubt supplemented the action of the sulphuric acid, as the bottles, when first noticed, were little more than three-fourths full, thus allowing space for a fair proportion of air.

In the *Pharmaceutical Journal* of October 29th, some interesting experiments of Dr. Richardson are noticed regarding the action of light and oxygen on some haloid compounds. When hydrobromic acid was exposed to

* We have retained the spelling of this word, as the author writes it. In accordance with our views expressed on page 218 of our last volume, the spelling *Quillaja* is preferable.

direct sunlight with a small proportion of oxygen, and in the presence of aqueous vapor, only .06% of free bromine was liberated after forty-six days, but with excess of oxygen under similar conditions, 7.6% of bromine was liberated after forty-five days. No decomposition was observed when the dry gases were exposed.

With this sample there was, as I have said, no exposure to light, nor undue excess of oxygen, so I am inclined to believe that the sulphuric acid was the principal decomposing agent.

I may also mention that the specific gravity of the solution is 1.085 –rather higher than the B. P. standard. This of itself would indicate either excess of hydrobromic acid, or the presence of some impurity.

I regret that I have had no opportunity of estimating the percentage of free or combined bromine in the liquid. The results would, no doubt, be of interest, and might throw some further light on the subject.—*Pharm. Journ.*

Sodium Sulphibenzoate.

STILL another compound has been added to the group of antiseptics, under the name of "*sodium sulphibenzoate.*" It is described by M. Heckel (*Comp. Rend.*, CV., 896) as being prepared by dissolving sodium benzoate in a strong solution of sodium sulphite, and was, in fact, the outcome of an attempt to combine the antiseptic properties of these two salts. The chemical and physical properties of the compound are not mentioned, beyond the statement that it is very soluble in water at the ordinary temperature; it is also affirmed to be absolutely innocuous to the human organism in large doses. But its antiseptic properties are declared to be very considerable, it being reported, as the result of clinical experiments in the hospital of Saint Mandrier, that a solution of sodium sulphibenzoate, in the proportion of 4 or 5 grains to a liter of water, used as an application to wounds, is superior to carbolic acid, and comparable in its good effects to the salts of mercury without their toxicity, or to iodoform, without its disagreeable odor.—*Pharm. Journ.*

Antipyrin in Sea-Sickness.

IN a note presented to the Academy of Sciences (*Compt. Rend.*, CV., 947), M. Dupuy calls attention to the value of antipyrin as a remedy against sea sickness. He states that he prescribed to some persons who had previously suffered terribly from sea-sickness, 3 grammes daily of antipyrin on the three days previous to embarking and the three days following, whilst some patients continued to take the medicine throughout the voyage, and he has been informed that all these persons crossed the Atlantic without suffering from sea sickness. This experience was subsequently confirmed in a communication from M. Ossian-Bonnet (*Compt. Rend.*, CV., 1,028), who states that, in about sixty cases occurring during a voyage to Buenos Ayres and back, he found antipyrin invariably effective in arresting sea-sickness, though the dose required was variable. In most cases 1.50 grammes was sufficient, the complete effect being produced in about ten minutes. In other cases the dose had to be repeated, but it was never necessary to exceed 3 grammes to produce cessation of the sickness within an hour. In a few cases, where the sickness was so incessant as to prevent absorption by the stomach, the same effect was produced by the hypodermic injection of 1 gramme of antipyrin.—*Pharm. Journ.*

Crystallized Colchicin.

NOT long since, in a case of suspected colchicin-poisoning, chemists were obliged to confess their inability to prove or disprove the presence of the toxic principle. Such an opprobrium on chemical science no longer exists, as M. A. Houdé, a Paris pharmacist, has discovered processes for preparing true crystallized colchicin, and identifying as well as estimating it in combinations and mixtures. The active principle—it is not an alkaloid—is obtained as follows: Powdered colchicum seeds are exhausted by percolation with about three times their weight of alcohol of 96 degrees. The percolate is evaporated *in vacuo*, at a low heat, until all traces of alcohol have been driven off. The residue, consisting of two layers—one watery and the other oily—is shaken in a separator with a 5-per-cent solution of tartaric acid. The operation is repeated several times to thoroughly exhaust the oily stratum, which is almost twenty times as bulky as the watery, and contains most of the colchicin. The acid liquor is now shaken first with ether, free from alcohol, to remove the last traces of fatty matters—colchicin being insoluble in ether—and then with chloroform, which takes up all the colchicin, together with some impurities. To purify it, the solution is concentrated by spontaneous evaporation, and petroleum ether of spec. grav. 0.620 cautiously added. The addition at first throws down coloring matters and impurities, but it must be stopped when the clear solution has turned from a dark-brown to a very light straw-yellow, else the colchicin would also be precipitated. Finally, the liquor, on being left to spontaneous evaporation, yields crystallized colchicin in the shape of long, colorless needles. The proportion obtained from the seeds is 3 per 1,000. An important point of the process is that no alkali and no mineral acid is employed, M. Houdé having proved they have both the effect of transforming colchicin into colchicein. Colchicin splits so easily under the influence of acids that even acetic acid will decompose it and form colchicein—a crystalline substance hitherto mistaken for true colchicin. The chemical until now regarded as colchicin is a mixture of the two substances. Hence the chemical reactions of true colchicin are substantially those already described, with one notable exception, however, namely, that the intense apple-green coloration afforded with ferric chloride, and insisted upon by most investigators, is characteristic of colchicein, but totally absent with pure colchicin not contaminated with colchicein. In toxicological researches, the poison is best extracted by macerating the organs, properly divided, in alcohol of 90 degrees acidulated with a little tartaric acid, distilling off the menstruum *in vacuo*, and shaking the watery residue with chloroform. By spontaneous evaporation of the solvent, colchicin is obtained in the amorphous state, and may be readily identified. The stomach, bowels, and liver are the organs in which colchicin is chiefly localized. Scarcely any is to be found in the kidneys or the saliva, and none at all in the blood.— *Chem. and Drugg.*

On the Use of Asbestos for Hastening Filtration, particularly of Viscid Liquids.

W. FRESENIUS reports in *Zeitsch f. anal. Chem.*, 1888, 32, that he has found finely picked asbestos to be the best medium for facilitating the filtration of viscid liquids. He found it especially valuable in filtering solutions of peptonized liquids, such as are produced by the action of any of the digestive ferments, and which it is next to impossible otherwise to filter through paper.

He states that he had previously made use of this useful property of finely divided asbestos, when he was occupied with the determination of the water-soluble portion of a very fine flour used as infants' food. It had been impossible to obtain a clear filtrate, until asbestos was tried, when there was no difficulty whatever.

All liquids which are obtained as products of artificial digestion, for instance, during experiments on the digestibility of albuminoids by gastric juice, or pepsin, or pancreatin, etc., exhibit an extreme reluctance to pass through filters, whether these are made from paper or from asbestos, and even if a portion passes through, this is always turbid. An acceleration of the filtration by means of the filter-pump is entirely useless, as this causes a still greater turbidity of the liquid. Under such circumstances, a filtration may last as much as 8 days, or may be practically impossible. A complete washing of the undissolved matter is, therefore, likewise either difficult or impracticable.

W. Fresenius states that he has recently succeeded in accomplishing the filtration by diluting with a considerable proportion of water, and then incorporating with the mixture a small quantity of previously ignited, finely picked asbestos, and thoroughly shaking. After about 12 hours, all suspended matters will have deposited, and the liquid may be easily removed by means of a siphon. The operation of washing and shaking is repeated once or twice with fresh water, and the whole mixture finally passed through a glass funnel, the neck of which contains a pellet of asbestos. If the first portion of the filtrate runs off cloudy, it is poured back until it is clear. Fresenius states that he allowed the residue in the funnel to become tolerably dry, after which he removed it for the purpose of determining the amount of nitrogen by Kjeldahl's method. Any matter adhering to the fumel can easily be wiped off by means of a small pellet of asbestos, and added to the rest.

Note by Ed. Am. Dr.—If the principle of this method of clarifying a liquid and aiding filtration is applied to the usual processes for estimating the digestive power of pepsin, or similar ferments, we would recommend to proceed as follows:

Dilute the liquid, at the moment when the digestion is to be interrupted, with a considerable quantity of water, saturate the whole liquid with chloroform to prevent its decomposition during the time of standing and filtering; then add to it a quantity of previously ignited, finely picked and weighed asbestos, about equal in weight to the quantity of albumen (if this has been used) originally employed, and shake vigorously and frequently until the supernatant liquid, on standing, is seen to become clear. Then allow the suspended matters to subside, pour off or siphon off the liquid, treat the precipitate twice more with pure water in a similar manner, and, finally, transfer the whole precipitate, by rinsing with water, to a previously washed, dried, and tared filter of loose texture (Stewart's are the best). Wash it with distilled water until a drop of the washings evaporated on platinum foil ceases to leave a residue. Then dry and weigh the filter and contents, and from the total weight deduct that of the filter and asbestos. The remainder represents the quantity of dry albumen left undissolved.

It is believed that a closer approximation to the correct amount can be obtained by the above method, or one embodying its salient features, than by any other, provided the undissolved albumen is to be determined by weighing it.

On Pure Mercurous Iodide and Bromide.

(Protiodide and Protobromide of Mercury.)

THE exact color of pure mercurous iodide has long been known not to be exactly like that under which the officinal salt presents itself in the market. Some years ago, Mr. Maclagan, chemist of the firm of McKesson & Robbins, drew attention to the fact that he had devised a process by which this salt could be obtained in a much purer and more uniform condition, and in this state the salt had a pure yellow color. Bouchardat had already obtained the salt in form of yellow, rhombic crystals (according to Descloizceaux, they belong to the tetragonal system), which, when rubbed to powder, furnish a yellowish-green product. It has long been suspected that the darkening of the salt is due to the influence of light.

A recent number of the *Berichte d. Deutsch. Chem. Ges.* (1887, No. 15, page 2,818) contains a paper by A. Stoman, relating to crystallized mercurous iodide and bromide, from which we take the following:

At the suggestion of Prof. Naumann (Giessen), the author undertook to study the products of the reaction of iodine and bromine upon mercury.

1. *Mercurous Iodide.*

On heating a *saturated* solution of mercurous nitrate, containing only a little free nitric acid, and being as free from mercuric salt as possible, to a boiling temperature, with *an excess* of *iodine*, the solution becomes covered with a yellow powder, which becomes partly dissolved. The clear, supernatant liquid, after being carefully decanted into a warmed capsule, and allowed to become cold, separates transparent laminæ, which are yellow as long as kept in the dark, and have a diamond-like lustre. If a different concentration of the mercurous solution is used, or too much nitric acid, or mercuric salt are present, the crystalline compound is not formed at all. These crystals are transferred to a filter, with as much exclusion of light as possible, and washed, first with water acidulated with nitric acid and then with pure water. Finally they are dried *in the dark*, at ordinary indoor temperature upon blotting paper which has to be frequently renewed. While damp, the crystals become darker even when exposed only to diffuse light. On exposure to direct sunlight, however, even the perfectly dry salt turns black.

These crystals, on being slightly magnified, appear as tetragonal lamellæ, and as analysis showed, constitute pure *mercurous iodide.*

On mixing a saturated solution of mercurous iodide, having the properties above described, slowly and carefully, and in the cold, with a moderately concentrated solution of *iodine* in *alcohol*, and shaking, the same crystals as above described separate almost immediately in minute scales. If, however, the iodine solution is added rapidly, a *yellow, flocculent precipitate* is produced, which analysis shows to consist likewise of *pure mercurous iodide.*

The reaction takes place, both in the presence of solid iodine, and of iodine in solution, according to the folwing equation:

$2Hg_2(NO_3)_2$	+	I_2	=	Hg_2I_2	+	$2Hg(NO_3)_2$
mercurous nitrate		iodine		mercurous iodide		mercuric nitrate

When heated, the crystallized mercurous iodide suffers a change of colors opposite to that of the mercuric salt: the *yellow* color passes over into *red.* Yvon observed this change of colors in crystals of mercurous iodide which he obtained by subliming weighed quantities of mercury and iodine. He states, however, that the red tint begins to show itself at 70° C., while Stoman observed a very gradual transition from bright yellow to dark yellow, orange and garnet, without being able to find—even in repeated experiments—any agreement between the temperatures at which these tints made their appearance. On cooling, the several colors reappear in a reversed order. At 100° C., the salt was always yet pure yellow. Stoman found that the salt sublimed always between 110° and 120° C. (Yvon gives 190° C.). An attempt to prepare the salt by Yvon's process furnished an impure product.

It will be of interest to describe the method of analysis employed by the author.

For the estimation of *iodine*, the salt was mixed with zinc-dust and hot water, which resulted in the formation of iodide of zinc. The latter was then decomposed, in solution, by nitrate of silver, and the iodine calculated from the obtained iodide of silver. The zinc-dust, which contained chlorine, was previously purified by washing with hot water. Results very accurate.

To estimate the mercury, the salt was decomposed with hot nitric acid of spec. grav. 1.420, which causes the escape of vapors of iodine. The solution was then diluted with much water and treated with hydrosulphuric acid gas, causing the precipitation of mercuric sulphide. But, owing to the presence of the large excess of nitric acid (required to dissolve the mercurous iodide), there is also separated a copious amount of sulphur. This is best removed in the following manner: After the hydrosulphuric acid gas has been passed long enough, a little soda solution is added, and the mixture gently warmed on the water-bath. The ascending bubbles of gas cause the particles of mercuric sulphide suspended at the upper margin of the solution to become loosened, and to fall to the bottom. The supernatant liquid, which has become completely clear after standing 12 hours, is then poured on the filter as completely as possible, and the latter washed with cold water. After cautiously neutralizing the remainder [of the liquid] with soda solution, the precipitate is warmed with a solution of sulphite of sodium, transferred to the filter, and washed with warm water.

Ammonia and caustic alkalies color mercurous iodide greenish; on heating, a black color appears and the iodides of the corresponding alkalies are at the same time formed. The black residue, containing the whole of the mercury, is partially soluble in hot hydrochloric acid, but some metallic mercury is left behind. Iodide of potassium likewise imparts a green color in the cold, a black color on warming.

Stoman declares the statement, that mercurous iodide precipitated by iodide of potassium has a *green* color, to be an *error. This is not the case with pure mercurous iodide.* On adding solution of iodide of potassium to one of mercurous nitrate, the nascent mercurous iodide is decomposed by fresh potassium iodide, and colored green. But on *dissolving iodide of potassium* in a small quantity of water, and *rapidly adding an excess of dilute solution of mercurous nitrate*, so that both become mixed at once, there is obtained a *yellow precipitate* consisting of *pure mercurous iodide.* The usually followed process for preparing mercurous iodide, viz., to rub together molecular quantities of iodine and of mercury, furnishes an *impure* product, precisely like that which is obtained by pouring solution of iodide of potassium into one of mercurous nitrate. The product being in these cases impure, it is more easily affected by light, and hence the green color. This curious coincidence [of similar colors being obtained by different processes] has been especially instrumental in confirming the idea that *pure* mercurous iodide was *green*, while it is, in fact, *yellow.*

The amorphous, yellow salt obtained by means of iodide of potassium may be dissolved in hot solution of mercurous nitrate, when it will be obtained in crystalline lamellæ, like that first described above.

2. *Mercurous Bromide.*

On shaking a solution of mercurous nitrate (such as above described) with bromine, a precipitate is obtained like that resulting from the action of bromide of potassium upon mercurous compounds. Under the microscope, it appears as a mass of minute, tetragonal lamellæ with blunted ends. The precipitate and liquid are poured off from the excess of bromine, and heated with 2 or 3 times its volume of solution of mercurous nitrate, when it will be dissolved either wholly or partially. The liquid is filtered into a previously warmed capsule and then allowed to cool, when *pure white scales, of a mother-of-pearl lustre*, of the same forms as those just described, will separate. These are pure *mercurous bromide.* The formation of this salt is less dependent upon strength and condition of the solution of mercurous nitrate, and the yield is also larger than in the case of the iodide. The crystals of the bromide are transferred to a filter and washed like the iodide. They are less sensitive to light, but are likewise decomposed—at least partially—on exposure to direct sunlight.

From the author's results, it follows that the most rational method to prepare *pure mercurous iodide* is to add to a concentrated solution of iodide of potassium a solution of mercurous nitrate, containing as little free nitric acid and as little mercuric salt as possible, care being taken that the solutions become mixed as quickly as possible.

There seems to be, however, no way to entirely prevent the gradual self-decomposition of the yellow mercurous iodide, since the least exposure to light appears to affect it. [Upon the degree with which light has acted on the salt, no doubt, depend the varying effects which are obtained with the salt by physicians. The purer the salt is the less harshly does it affect the organism. And to retain the salt in as pure a condition as possible, renders it necessary that it be carefully kept from the light. In the case of this salt, perhaps more than in any other, there is really an advantage to have it put up, as soon after manufacture as possible, in a form in which it can be carried and administered without risk of further alteration. The best method is undoubtedly in the form of granules or pills, coated so that the light will not penetrate further than the surface.—ED. AM. DRUGG.]

Runaway Pharmacists.—When the cholera epidemic broke out in Sicily about two months ago, several local pharmacists fled from the afflicted districts. They returned when the scourge disappeared, and have now been sentenced by the Messina Court of Justice for dereliction of duty to a fine of 2 *l.* each and the prohibition of exercising their business for the space of three months.

Imitation Maple Sugar.

A CURIOUS patent has been granted to Josiah Daily, of Madison, Ind., for a process to make imitation maple sugar. How Mr. Daily managed to obtain such a patent, or to convince the examiners that his invention was original, is a mystery to us. To a certain extent, perhaps, there may be a little originality about it, in so far as he derives the flavoring from *hickory* bark and wood, instead of the maple itself. But we have heard of this trick many years ago, though, perhaps, it may not have been given out in print.

He directs the extract of hickory to be made either by preparing a decoction of hickory bark or wood, or by percolation, or by drawing the sap from the tree.

For making artificial maple syrup, he appears to prefer the commercial syrup obtained from the sugar houses, and directs adding to each gallon about three tablespoonfuls of the decoction. On boiling down such a syrup, artificial maple sugar will be obtained.

Maple sugar is a sort of luxury, which many persons have no great longing for. A very large number, also, who profess to know all about it, are regularly "taken in" with their annual purchases. The new patent will perhaps enable the latter to save a little more, by showing them how to make it themselves.

Cod-Liver Oil Emulsion.

AT a recent meeting of the Edinburgh Chemists' Assistants' Association, Mr. James Mackenzie, among other subjects, brought forward a formula for a Cod-Liver Oil Emulsion. It is as follows:

Tragacanth	1 drachm.
Acacia	1½ drachms.
Arrowroot, Bermuda	1 drachm.
Cod-Liver Oil	6 oz.
Water	6 "
Spirit of Chloroform	1 drachm.
Saccharin	3 grains.
Oil of Cinnamon (Cassia)	9 minims.

Put the powders in a dry mortar, add a little of the oil, and rub well together until it has a creamy appearance; then add the remainder of the oil, and mix. When the powders are well diffused throughout the oil, add the water all at once, and use the pestle diligently until the emulsion is formed. Dissolve the Saccharin in the Spirit of Chloroform, and to the solution formed add the Oil of Cassia, and incorporate this in the emulsion. The Saccharin should be dissolved in 3 fluidrachms of Alcohol by the aid of heat, and 3 drops of Chloroform added to the solution.

Note.—The weights are intended to be avoirdupois, the drachm being meant for ⅛ av. oz.

Naregamia Alata—The Ipecacuanha of Goa.

MR. DAVID HOOPER directs attention to a plant described by Dr. Dymock in his "Vegetable Materia Medica of Western India," and which seems to have been little known or used away from its habitat. The natives of Goa use it as an emetic and as a remedy for bile, rheumatism, and indigestion, and usually in the form of decoction. The *Pharm. Journal* of October 15th gives a botanical description of the plant and the drug. The latter consists of the root, with the slender stems attached. The root-stock is contorted and warty, and with the roots is pale-brown; the mealy suberous layer may easily be removed by rubbing. The stems are a dirty green, with the bark more firmly adherent. A transverse section of the root exhibits a brown outer layer of bark, with a light-colored interior and a yellowish wood. Application of iodine solution shows the presence of starch in the fibrous portion. The drug is with difficulty powdered in a hand-mortar. Its activity resides in its cortical portion, which forms one-third of the whole. The powder is light-brown, with a peculiar aromatic and pungent odor, and a slightly bitter and nauseous flavor. It contains an alkaloid, an oxidizable fixed oil, and a wax, the former receiving from Mr. Hooper the name *naregamine*. These three are extracted by ether; an alcoholic extract consists mainly of sugar; an aqueous extract yields a gum and a crystalline alkaloid resembling asparagine. The experiments which have been made in India and England show that its effects re quite the same as those caused by the Ipecacuanha of commerce.

Phenacetin.

IN the beginning of the preceding year (1887), a new antipyretic was announced, to which the name "p-acetphenetidin," and "acetylamidophenol" had been applied. Subsequently more definite information was given as to the chemical constitution of this compound, from which it appeared to be analogous to antifebrin or acetanilide. The compound for which the shorter and more convenient name of "*phenacetin*" has now been chosen, appears to have been tested therapeutically, and its properties are referred to more in detail (*Pharm. Centralhalle*, Nov. 24th, p. 583). It is described as a faintly reddish, odorless and tasteless powder, which dissolves with difficulty in water, somewhat better in glycerin, but most freely in alcohol, especially if hot. It is insoluble in acid and alkaline liquids, and experiments as to its solubility in the acid juices of the stomach and in pancreas have given only negative results. Professor Von Bamberger states that phenacetin administered in doses of 0.5 to 0.7 gramme to healthy persons seemed to produce hardly any effect, the influence upon body temperature being barely perceptible; but when administered to fever patients, even in the relatively small doses of 0.3 to 0.4 gramme, it never failed to produce a marked antipyretic effect. In the first tentative experiments, doses of only 0.2 to 0.4 gramme were administered, which produced a regular fall of temperature, but this was of slight intensity and of short duration. As, however, the safety of the remedy became manifest, these doses were increased to 0.6 and 0.7 gramme, which quantity has not been observed to produce any disagreeable or injurious symptoms.—After *Pharm. Journ.* (Dec. 3d).

New Method of Preserving Butter.

MR. PIERRE GROSFILS, of Vervier, has communicated to the Société d'Encouragement de Vervier a new process for preserving butter, which may, perhaps, be applied to also to other fats. M. Grosfils describes the various phases of his research as follows: He first mingled 1 gramme of salicylic acid with 1 kilo of butter, but after some weeks the product had altered. He thought that the cessation of the antiseptic action of acid was due to its crystallization in the non-liquid substances which were mingled with it. After numerous experiments, he found that lactic acid prevents this crystallization. This acid is, in fact, a good solvent for salicylic acid. It has the advantage of being hygroscopic, of possessing antiseptic power, and, finally, of being uninjurious in food.

The first result of the discovery of M. Grosfils was to be able to diminish the amount of salicylic acid used to preserve the butter. Instead of mixing 1 gramme of acid per kilo, he put the butter in a liquid containing 0.05 per cent of salicylic acid and 3 per cent of lactic acid. He successively divided the salicylic acid into still smaller doses, until at last he had the proportion of 1 gramme of acid to 5,000 parts of water. The final composition consisted then of 98 parts water, 2 parts lactic acid, and 0.0002 of salicylic acid. This composition allows of the indefinite preservation of butter of good quality even at a high temperature and in hot countries. If the butter has already undergone some alteration, a stronger dose must be used.

But the author points to the following fact: The lactic acid contained in the antiseptic liquid in doses stronger than 2 per cent gives the product a taste which, without being offensive, is a little too sour to leave the article salable. In such case, the butter should be washed with water, or, better still, with scalded milk, to which a little carbonate of soda has been added, to prevent any coagulation of the casein. This washing will not only remove the lactic acid and its taste but also the salicylic acid solution, to such a degree that what remains will be imperceptible.

The process is stated to be most economical, as the antiseptic liquid will serve indefinitely, being unalterable. Care must be taken each time to use the same quantity of butter.

The preparation of a kilo of butter by this process, it is stated, will not cost more than one or two centimes.—*Monit. Indust.* and *Sci. Am. Suppl.*

A Convenient Method for Preparing Pure Hydrosulphuric Acid Gas.

CLEMENS WINKLER recommends sulphide of barium as a convenient source of hydrosulphuric acid gas, particularly when it is wanted absolutely free from arsenic. He states that he has used the above compound for this purpose for the last twenty years.

The kind of sulphide of barium suitable for this purpose is prepared by mixing sulphate of barium, powdered charcoal, and a fusible salt soluble in water, for instance, chloride of sodium, and heating them together. The best proportions are:

Sulphate of Barium	100 parts.
Charcoal, powdered	25 "
Chloride of Sodium	20 "

The two first-named substances are finely ground together, the chloride of sodium then added, and the mixture formed, with the aid of a little water, to a slightly damp mass, which is tightly packed into clay crucibles of suitable size (for instance, 10 inches high and 4 inches in diameter). The crucibles and contents are then dried with a moderate heat, some coarsely powdered charcoal put on top of the mass, and the lids luted on with clay, a small hole being left for the escape of gases. The crucibles are then heated for several hours to an incipient white heat, after which the heat is gradually moderated, the crucibles taken from the furnace and allowed to cool.

On turning the crucibles over, the sulphide of barium will drop out in form of partly fused, very hard cones, which possess the shape of the crucible in a contracted form. By strong blows with a hammer, these cones may be broken into suitable pieces which, when brought in contact with dilute hydrochloric acid (in a Kipp's or other form of generator), evolve a steady and abundant stream of hydrosulphuric acid gas, and are gradually dissolved, leaving only a slight carbonaceous residue.

Sulphide of barium should be kept in a moderately warm and dry place in well-closed vessels; tin boxes are very convenient, both for preserving and for transporting it.—After *Zeitsch. f. Anal. Chem.*, 1888, 26.

Determination of Sodium Phosphate in Glacial Phosphoric Acid.

ANTON BETTENDORFF reports that he had been requested to examine a specimen of commercial glacial phosphoric acid for arsenic, and on using for this purpose the test with stannous chloride, which requires a previous solution of the substance in hydrochloric acid of spec. grav. 1.190, he obtained a copious quantity of brilliantly white, small crystals, which turned out to be chloride of sodium, while the phosphoric acid itself was nearly all dissolved in the liquid.

The glacial acid itself being free from chloride, it was evident that the sodium existed in it as sodium phosphate. The presence of this salt in commercial glacial phosphoric acid is well known, but its determination by means of converting the salt into chloride of sodium had not been suggested before. The author finds that 1 part of chloride of sodium requires, at a temperature of 12° C., 1,348 parts of fuming hydrochloric acid of spec. grav. 1.190 for solution.

The difficult solubility of chloride of sodium in fuming hydrochloric acid, therefore, explains its formation and separation from the glacial phosphoric acid containing sodium phosphate.

In order to study the reaction, the author dehydrated some sodium phosphate, and subsequently ignited it in order to remove the carbon compounds which are always present in it. 3.701 Gm. of the resulting sodium pyrophosphate were introduced into 50 C.c. of fuming hydrochloric acid of spec. grav. 1.190, and the mixture set aside for twelve hours. The resulting chloride of sodium was separated from the liquid by passing it through a filter of spongy platinum, and washed several times with fuming hydrochloric acid. The weight of the melted chloride of sodium amounted to 3.2055 Gm. (by calculation, 3.2531 Gm.). The filtrate evaporated, and the residue ignited, furnished perfectly transparent metaphosphoric acid which was soft at ordinary temperature, and weighed 2.298 Gm. (instead of the calculated 2.2247 Gm.). Hence, the decomposition between pyrophosphate of sodium and fuming hydrochloric acid is complete at ordinary temperatures. With a weaker acid, the decomposition is incomplete, considerable amounts of pyrophosphate of sodium remaining in solution.

The addition of sodium phosphate is made only for the purpose of hardening the product, so as to enable its being cast in sticks. If a pure glacial or metaphosphoric is required, this may be easily prepared in the following manner:

Reduce sodium pyrophosphate, previously ignited, to powder, treat it with hydrochloric acid of spec. grav. 1.190, separate the chloride of sodium formed, then remove any arsenic present in the residuary liquid, evaporate the liquid finally obtained in a platinum vessel, and ignite the residue.—After *Zeitsch. f. Anal. Chem.*, 1888, 24.

The Assay of Sulphurous Acid.

BUNSEN'S method of assaying sulphurous acid by means of standard solution of iodine suffers from one defect, namely, that the sulphurous acid must be in very high dilution, containing not more than 0.03 to 0.04 per cent of SO_2.

Bunsen supposed that the reason why, in more concentrated solutions, sulphurous acid failed to completely fulfil its functions as a reducing agent was this, that the generated sulphuric acid acted upon the hydriodic acid produced during the action, by oxidizing the latter and itself returning to the state of sulphurous acid.

This reason did not appear satisfactory to Prof. J. Volhard, who determined to ascertain the true cause of the peculiar phenomenon alluded to, and also, if possible, to find a way to free the volumetric method of assay from the defect inherent in it.

Experiments showed that ordinary diluted sulphuric acid dissolves iodide of potassium to a colorless liquid. Only after standing some time does this become brown, no doubt caused by the oxidization of hydriodic acid through the oxygen of the air. Even a stronger sulphuric acid does not set iodine free; only concentrated sulphuric acid is able to accomplish this. Consequently, Bunsen's explanation of the retrograde reaction, when sulphurous acid, iodine, and water are brought together, cannot be correct.

In order to ascertain the true cause, Prof. Volhard instituted a series of experiments to follow the reaction quantitatively step by step, and under varying circumstances. Bunsen himself had already pointed out that the concentration of the solutions exerted a great influence; and Finkener had found that the reaction between iodine and sulphurous acid yielded uniform results only when the sulphurous acid is allowed to flow into the iodine solution under stirring. If the latter is poured into the former, there is always a smaller quantity of iodine consumed. According to Finkener, the difference in iodine amounts to only 0.5 per cent, but this is a mistake.

Volhard confirms Finkener's statement, that sulphurous acid is *completely* converted into sulphuric, when the former is allowed to flow under stirring into the iodine solution; and this is the case, not only when the acid is very dilute, but even when it contains nearly up to 2 per cent of SO_2. On the other hand, if the process of mixing is reversed, even the most dilute sulphurous acid will, in different trials, consume varying amounts of iodine, but always *less* than the theoretical amount. The deficiency increases with the concentration of the sulphurous acid solution. In a solution containing 0.0153 per cent, it amounted, on an average, to 5 per cent of the contained SO_2; in a solution holding 0.1 per cent, the loss represented 13 per cent of this amount; in one of 0.2 per cent, the loss reached 15 per cent; and in one of 1.8 per cent, it rose to fully 24 per cent of the SO_2.

The lesson to be derived from these results is this, that in assaying sulphurous acid, the latter should be brought to a moderate state of dilution—about 0.2 per cent (but this may vary up to 1 per cent)—and to allow this solution to flow from a burette into a measured quantity of volumetric solution of iodine mixed with a little gelatinized starch, until the iodine solution has just acquired a blue color.

Volhard remarks that in iodometric assays he prefers to carry the reaction to a blue color rather than to colorlessness. Absence of color does not admit of gradation, or reveal an excess of a reagent; but when the reaction is continued until the blue tint appears, the slightest further excess will cause a deepening of the color.

Having thus determined the best method by which uniform results in the assay of sulphurous acid could be obtained, it still remained to ascertain, if possible, the cause of failure when the process of mixing the solutions was reversed.

Volhard found that when powdered iodine was added to a saturated aqueous solution of sulphurous acid (containing about 14% of SO_2), the iodine disappeared rapidly, but the solution, instead of being colorless, acquired a light yellow color. This, on further addition of iodine, becomes brown. And when about $\frac{1}{8}$ of the theoretical amount of iodine has been added, the solution has become opaque, and of a dark brown color from free iodine. It colors starch-paper blue, and has an intense odor of sulphurous acid. Consequently the latter, as well as free iodine, may be present together in very concentrated solution, at least for some time. After a few hours, however, the sulphurous acid disappears, but *with separation of sulphur.*

This phenomenon made it probable that hydriodic acid exerted a reducing action upon sulphurous. Indeed, when the two bodies are brought together in a gaseous form, the result is iodine, water, and sulphur, which reaction would be expressed as follows:

SO_2	+	$4HI$	=	S	+	$2H_2O$	+	$4I$
sulphurous anhydride		hydriodic acid		sulphur		water		iodine

However, the real reaction is not as simple as this scheme would show.

On adding to 1 volume of a concentrated hydriodic acid solution 1 or 1½ volumes of a saturated solution of sulphurous acid, iodine is set free. But on shaking, and, if necessary, further addition of sulphurous acid, the brown zone formed at the line of contact of the two liquids immediately disappears, and the mixture acquires a clear bright yellow color. The latter is not due to iodine, as the liquid does not color starch-paper blue; but it has an even stronger reducing action than sulphurous acid itself, as shown by its effect on indigo solution. The liquid retains its bright yellow color for some time, but after awhile it become turbid from separated sulphur, which gradually increases in quantity, and appears partly in form of a lump (when the liquid is shaken), and partly as a firm coating on the inner walls of the vessel. After some time, all the sulphurous acid is decomposed, the time required depending on the relative proportions of the two acids. If hydriodic acid is in excess, the reaction is completed in 24 hours, but the liquid still possesses a brown color.

Now the question arises: There being no gas given off during this reaction, what has become of the oxygen which had been combined with the sulphur that has been precipitated?

Volhard found that this existed in the shape of *sulphuric acid.* At the close of the reaction, the liquid contained almost exactly 2 molecules of sulphuric acid to 1 mol. of sulphur.

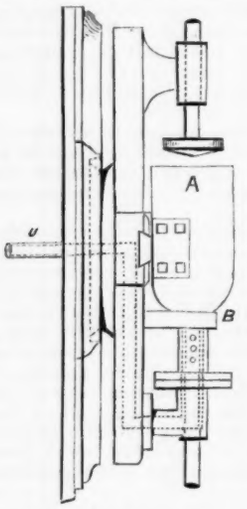
From these and some further experiments detailed by the author (but omited here) it results that when *iodine* is *gradually added to* sulphurous acid solution, a portion of the SO_2 is reduced to sulphur by the generated hydriodic acid, the amount thus reduced diminishing in direct proportion to the strength of the sulphuric acid solution.

Bunsen's explanation, therefore, requires only that the word "sulphurous" be put in place of "sulphuric," when it will give the correct explanation of the phenomenon.—After *Liebig's Annal.*, 242, 93.

A BOTTLE-MAKING MACHINE.

A NEW invention, at present the property of Messrs. Sykes, Macvay & Co. (Lim.) of London, and about to be put in operation at their works in Castleford, Yorkshire, bids fair to revolutionize the manufacture of bottles. As heretofore practised, the process was the following:

The glass "metal" is heated to a semi-liquid state in large fire-clay pots of peculiar construction, into which one of the set of five hands required for turning out the bottles dips an iron tube about seven feet in length, collecting at the end of it such a quantity of the fused substance as will make a bottle of the size required. The first hand, technically known as the "gatherer," hands the tube to the blower, who, blowing in it meanwhile, shapes it roughly into a conical form on a smooth sloping stone slab. The "metal" is next quickly placed by this workman into a small hole in the floor of the workshop, in which there is an iron mould divided longitudinally and hinged at the base, connected with a chain running upwards like a bell-pull. This the blower pulls, and thereby closes the mould round the heated glass. He then again vigorously blows through the tube until the embryo bottle has attained the shape of the mould, when



Bottle-Making Machine.

Nursery Thermometer.

by another tug at the chain it is released from the mould and handed to a boy. The latter, known as the "wetter-off," by means of a moistened steel file or chisel separates the bottle from the tube and hands it to the fourth workman, whose share in the manufacture requires the greatest dexterity of all. It is his business to trim the ragged neck and add to it a ring or lip. This he accomplishes by means of an instrument known as a "punty," a kind of four-fingered iron claw at the end of a rod, into which the bottle fits exactly, the four claws reaching just to the neck of the bottle. With the punty the bottle is pushed into a furnace and held there until the glass of the neck becomes soft. Then the "maker" applies some more molten metal round the neck, with which he forms the ring, and shapes it by means of a moulding tool called shears, consisting of a tongue fitting into the neck of the bottle, and two blades which are tightened round the neck. With this, while the bottle is being rapidly rotated with the tongue for its axis, he quickly shapes the ring. The fifth hand of the set then takes the bottle and places it with others into an annealing oven, which is heated to a very high temperature, and is allowed to cool gradually, two or three days being required for this purpose, when those that have withstood all tests and literally passed unscathed through the fiery furnace are ready for the market. The process above described, though followed with little deviation at all glassworks, has many evident drawbacks. One great disadvantage is the waste of glass metal, computed at something like thirty per cent. The bulk of this is, of course, collected again, but in remelting its quality deteriorates considerably. The blowing of the bottles is said to be an occupation almost as unhealthy as any in the manufacturing industries.

The new bottle-making machine will, it is thought, put an end to all or most of these obstacles. The apparatus is so simple, and yet, so far as can be judged from a casual visit and necessarily superficial inspection, does its work so efficiently that one marvels how such a simple idea can have so long remained unappreciated. The accompanying sketch shows the principle which underlies Mr. Ashley's invention, and represents the machine as it is working at present, though several improvements have already been patented by the inventor, and the completed machine will probably be in working order early in the spring. The principal parts of Mr. Ashley's machine are a parison mould (A), which can be drawn into a bell by means of a lever, and hermetically closed, the halves being supported by two arms. To the mould is attached a movable end, connected with an air pump, by which a vacuum can be created within the mould. The molten glass is poured into the parison mould, which holds the exact quantity required to manufacture a bottle. Another mould, called the "collar mould" (B), which is placed at the bottom of the parison mould, serves to mould the lips of the bottle. Air, forced by a pump, which is connected (*u*) with the stand upon which the machine is supported, is introduced into the hollow, central part of the mould, the molten glass being prevented by a button from entering the latter. The lip of the bottle is shaped first, and the mould is then quickly reversed, causing the moulten glass to fall down by its own weight. When the mass has descended to the length required, the halves of the mould are closed on it, a current of air from the pump is turned on, and the bottle quickly blown into the shape of the mould. A different mould is, of course, required for each kind of bottle. The principal improvement which is proposed to introduce into the machine now at work is to fix a number of machines—say four, six, or more—on a revolving stand, turning round as quickly as possible, one man being continually employed filling the moulds with a glass metal, another working the air-pump and closing the moulds, and a third taking out finished bottles.

The first result of the introduction of the perfected machines will be to diminish the number of the hands employed, but as a large increase of orders is anticipated, owing to the impossibility of foreign competition, which now supplies this country with about 16,000 gross of bottles per day, or two and a half times as much as we ourselves manufacture, it is thought that the growth of business will quickly necessitate the employment of even a larger number of hands than are now engaged. The inventor of the machine claims that the producing capacity of Messrs. Sykes, Macvay & Co.'s works, if sixty machines were set at work (one for each "hole" now existing), would be increased tenfold, or from 5,400 to 54,000 dozen bottles per day, while, instead of 300, only 180 hands would be required, and the cost of labor would be reduced from 3*s.* 10*d.* to 3*d.* per gross. The exploiters of the patent propose to allow other firms to use the machine upon payment of a royalty, but all the machines will be made at the Sykes-Macvay Works, and duly numbered and registered.—*Chem. and Drugg.*

A NEW NURSERY THERMOMETER.

THE adjoining illustration from a German source shows a felicitous combination of a thermometer with a bottle, which is also provided with a scale of proportions for mixing the ingredients of infants' food. The thermometer is likewise useful for regulating the temperature of a room or of a bath. The combination is the suggestion of Ernst Witter, of Unterneubrunn, near Eisfeld.

New Name Proposed for Antipyrin.—Considering that the compound is not an antipyretic, but a pain reliever, and that its true chemical name, oxydimethylquinizine, is rather inconvenient, M. Nicot, a well-known Paris pharmacist, has proposed for it the appellation *parodyne*, from two Greek words (*para* and *odune*), meaning "against pain." Thus rechristened, antipyrin could be freely prescribed and dispensed without regard to trade-mark rights. French pharmacists feel sore about antipyrin, not so much, perhaps, because it is of German origin, as because a shrewd device has enabled its makers to evade the patent-medicine law, and enjoy privileges denied to French pharmacists and chemists.

Glycerin and Cocoa Cream for Chapped Hands, etc., is made from the following formula: White wax, ℥ xiv.; spermaceti, ℥ iij.; cocoa butter, ℥ ix.; castor oil, ℥ ix.; oil of benne, ℥ vi. Melt and mix; then add glycerin, ℥ ij. Perfume to suit taste. This makes quite a nice preparation. Petrolatum is used instead of the oil of benne (sesame oil) by some, and is considered an improvement. Either, however, will do.

Reaction of Strophanthin.—When a trace of strophanthin is dissolved in a drop of water, together with a trace of ferric chloride, the addition of a little strong sulphuric acid gives rise to a reddish-brown precipitate, which, in an hour or two, changes color to a permanent emerald green.—H. HELBIG in *Pharm. Journ.*

Bottles.—It is estimated that 6,686,208 bottles are made daily in Europe—chiefly in Germany and Belgium—Great Britain turning out only 893,664 of the total number.

THE

American Druggist

AN ILLUSTRATED MONTHLY JOURNAL

OF

Pharmacy, Chemistry, and Materia Medica.

VOL. XVII., No. 2. WHOLE No. 164.

FREDERICK A. CASTLE, M.D.....EDITOR.
CHARLES RICE, PH.D.....ASSOCIATE EDITOR.

PUBLISHED BY

WM. WOOD & CO., 56 & 58 Lafayette Place, N. Y.

SUBSCRIPTION PRICE per year, - - - - - - $1.50
SINGLE COPIES, - - - - - - - - - .15

Address all communications relating to the business of the AMERICAN DRUGGIST, such as subscriptions, advertisements, change of Post-Office address, etc., to WILLIAM WOOD & Co., 56 and 58 Lafayette Place, New York City, to whose order all postal money orders and checks should be made payable. Communications intended for the Editor should be addressed in care of the Publishers.

The AMERICAN DRUGGIST is issued in the latter part of each month, dated for the month ahead. Changes of advertisements should reach us before the 10th. New advertisements can occasionally be inserted after the 18th.

REGULAR ADVERTISEMENTS according to size, location, and time. Special rates on application.

EDITORIALS.

ALCOHOLIC solutions of nitroglycerin have lon gbeen an article of commerce. That which is used for medicinal purposes is usually of the strength of *one* (1) *per cent* (see answer to query 2,097). Wholesale dealers are in the habit of ordering and obtaining their supply in form of a 10-per-cent solution in alcohol, directly from the nitroglycerin works, and many customers of the wholesale houses order the 10-per-cent solution likewise, so as to save bulk in shipping. Regarding these solutions, and particularly the 10-per-cent solution, several important facts have recently become known, regarding at least one of which it is very much desirable that those who have to handle the article shall be thoroughly posted.

The writer of this note had applied to Prof. Charles E. Munroe, U. S. Navy, at the Torpedo Station, Newport, R. I.—who is recognized as the foremost expert on high explosives in this country—for information regarding certain facts concerning nitroglycerin, for medicinal use, to be used in constructing the text of one of the articles of the forthcoming National Formulary.

Since it appears desirable that the more important portion of the information received should be made known as soon as possible, the following abstract is published here:

1. It has been repeatedly stated that a 10-per-cent alcoholic solution of nitroglycerin is non-explosive, but, so far as the pharmaceutical public is concerned, this information was not known (or known to but few) to be absolutely reliable. Prof. Munroe expressly states that this statement is correct, such a solution being *absolutely non-explosive.*

2. Prof. Munroe being asked the question, whether the admixture of an alcoholic solution of nitroglycerin with packing material, or other absorbent substances, caused by a fracture or breakage of the container, would render the packing material, etc., explosive, after the evaporation of the alcohol, answered, that the *absorbent would certainly become dangerous*, but that the rate of danger would depend upon the relative proportions of absorbent and nitroglycerin. According to his statement, a mixture of not more than 70 per cent of nitroglycerin with not less than 30 per cent of infusorial earth, or charcoal, or sawdust, etc., is non-explosive. That is, it cannot be exploded by anything else than a so-called detonator. And a mixture containing not more than 52 per cent nitroglycerin, and not less than 48 per cent of infusorial earth, etc., ceases to be explosive even with a detonator, or as the term is, cannot be detonated. *But* if the absorbent material should be any oxidizing substance, such as a nitrate, a chlorate, etc., etc., *even as small a proportion* as *five* (5) *per cent* of nitroglycerin may render the combination *explosive.* A strong blow or concussion, therefore, may cause an explosion. Let us suppose that a glass-bottle containing an alcoholic solution of nitroglycerin has peen packed with other goods, that it has broken and the contents leaked into a package of powdered nitrate of potassium, or other oxidizing substance; on evaporation of the alcohol, this would be a decided source of danger.

For this reason, alcoholic solutions of nitroglycerin should always be kept and transported in vessels which are not liable to fracture. *The most suitable are tin-cans, such as ether is put up in.*

It has been repeatedly proposed to diminish the suspected danger arising from an accidental evaporation of the alcohol of such a solution, by adding to it a certain proportion of some non-volatile liquid, which might either hold the nitroglycerin in solution, or at least partly dilute it, after the alcohol is dissipated. Glycerin has, among other things, been proposed for this purpose, by the writer and also by others. According to Prof. Munroe, however, this is *not* advisable. He says, he would be apprehensive of danger in handling *any* nitroglycerin which is mixed with glycerin or with any fatty or oleaginous material. He adds: "The fact is, we have to be careful about getting such substances into nitroglycerin. Many of the accidents have been caused by the fact that the glycerin used in the manufacture has contained some small amount of fatty acids. It is possible that, on a warm day, nitroglycerin might explode from the presence of fatty acids. From my experience, I should be apprehensive of it, and would *not* recommend the use of any other solvent than alcohol."

3. In case any solution of nitroglycerin, or the latter itself in a pure state, has been spilled, Prof. Munroe advises to render it innocuous by applying a solution of sulphocarbonate of sodium. This is directed to be prepared by dissolving sublimed sulphur in a solution of sodium carbonate, by the aid of heat. A bottle full of this solution should always be kept near the vessel in which the stock-solution is kept. When any of the latter is spilled, it should be wiped up as carefully as possible, and the place or absorbent material which has soaked it up, should be thoroughly drenched with the above mentioned solution, which is technically termed "sulphur solution." Of course, the cloth which has been used to wipe it up should likewise be saturated with this liquid.

IN the course of a critical examination of a series of dates of references given in the foot-notes of a recent work on organic analysis (see page 40), our attention has been directed to the fact that much difficulty is often encountered by the absence of any definite information regarding *the date, up to which the information* furnished by the respective text *may be regarded as being reasonably complete*, or as being based upon all that has been made public up to the time of publication. In chemical works, perhaps more than in any others, the knowledge of such a date would save much waste of time, and would enable the reader or user quickly to complete the available record by referring to files of journals, annual resumés, etc., published *after* the indicated date.

Under present circumstances, an idea as to the time when a given author's text on any subject was completed (which may have been many months previous to the actual issue of the book itself), can only be obtained by examining the dates of the references which the author quotes. Some authors, in doing this, frequently quote, besides the name of a writer, the name of the journal, with volume and page, and *omit the year* of publication, which renders it mostly impossible—without the aid of special lists, or a chance of consulting the original—to fix

the date of the quotation. Such a date is of great importance, as it may either show the information to be likely antiquated, or it may form the starting point for researches in literature of later date.

We would therefore propose as an improvement that, in all works of reference, for instance, such as treat on subjects of chemistry, descriptive or analytical, or on materia medica, or in fact on any subject regarding which there is a constant accession of new facts and discoveries, *the author specify the date up to which the text of any article may be considered as completed.* This may be done by appending, at the end of each paragraph (if the work is lexicographically arranged) the date, in which the number of the month is best given in Roman numerals, for instance: "(III., 17, '88)," meaning that up to the 17th of March, 1888, the literature which *had appeared up to that time* had been consulted by the author. This date should *not* mean that on which the *printing* of the article has been commenced or concluded, as this is of less importance for the reader to know than the former.

Another method for giving this same information is that which we have mentioned several years ago, by correspondence, to some of our literary friends, and which we observe carried out (though probably without any knowledge of such a plan having previously been thought of) in the new edition of the most important work of reference on the field of organic chemistry, viz., Beilstein's "Handbuch d. Organischen Chemie," vol. II., beginning with page 65. On this page, and every following, the inner margin of the page-heading bears a printed date (f. i., 13. 8. 86), which denotes the date up to which the literature referring to the subjects on that page has been completely made use of, or laid under contribution. The reader will then know at once that for any further information he will have to consult journals, books, etc., which have appeared subsequent to the 13th of August, 1886, and he will not need to consult those previously published, except to verify statements or obtain fuller details, or for other special reasons.

Of the two methods thus outlined, the second one is preferable in the case of works which are wholly written or revised by one author, or several authors conjointly. In the case of dictionaries of chemistry or other works in which the several articles are contributed by different authors, the first-mentioned plan is the better one, as each author will have to specify the particular date himself, and there may be but few bearing the same date.

We hope that the propositions here made will receive the favorable consideration of authors and publishers of works of reference.

We gave, in answer to Query 2,080 in the foregoing number, a new process for preparing cod-liver oil emulsions, by means of mucilage of dextrin, and we now wish to draw attention to the fact that this vehicle is one of the best to emulsify and keep in suspension balsam of copaiba or other oleo-resins. The well-known Lafayette Mixture, when prepared with this mucilage, is much more permanent, and less liable to separate, than when prepared with mucilage of acacia. We have had this mixture prepared for some time by the following formula:

℞ Copaibæ	fl.	℥ ij	
Liq. Potassæ	fl.	ʒ j	
Spir. Æther. Nit.,			
Tinct. Lavand. Co.,			
Syrupi āā	fl.	℥ ij	
Mucilag. Dextrini q. s. ad	fl.	℥ iv	

It is suggested that the establishment of a section on Pharmacy in the American Medical Association is desirable. There is some doubt as to the probability of this body accepting such advice, but there is no doubt that the majority of physicians are in need of more information respecting the articles they use, or ought to use.

Henry Carey Baird & Co., of Philadelphia, announce the publication of a new treatise on animal and vegetable fats and oils by William T. Brannt, in 1 vol. of 739 pp. 8vo, with 244 engravings. Price, $7.50.

The *Druggists' Circular*, in its January number, announces a new feature with considerable rhetorical flourish, in the course of which it expresses a hope of pardon for asking attention

"to the fact that, so far as we can discover from extended observation, this journal is the first to be published with a regular alphabetical index for each number."

The observation of the editor could not have extended *very* far, for it is now about ten years since New Remedies began to publish in every number a complete and alphabetically-arranged index of its contents, and it continued to do so until it adopted its present form and title. Within that period, one of our Chicago cotemporaries (if our memory serves us) did the same thing for some time. We never claimed originality for the scheme.

Distinction of Raw and Boiled Linseed Oil.

Exception has recently been taken to the statement in the United States Pharmacopœia, under Oleum Lini, that this oil is soluble in 5 parts of absolute alcohol. Various writers have reported that a much larger quantity of the solvent was required. At the October Pharmaceutical Meeting of the Philadelphia College of Pharmacy, this matter was incidentally touched upon, and the discussion afforded at least a partial explanation of the different statements. We take the following from the *American Journal of Pharmacy* (p. 587):

"Mr. England stated that he made linseed oil with bisulphide of carbon, but that it required 10 parts of absolute alcohol to dissolve it. Prof. Maisch asked if the oil had been made from the seed ground by Mr. England, or from flaxseed as purchased. The commercial *meal* had been used. It is well known that the oil changes rapidly in ground seeds, especially flaxseed, this oil being of the class called drying oils. Mr. Moerck said that linseed oil made from *freshly-ground seed*, with petroleum spirit of light gravity, required *but five* (5) *parts of absolute alcohol*, and that made with bisulphide of carbon required about 10 parts. . . . Mr. Thompson wished to know how cold-pressed oil might be discriminated from that made by heat and pressure. It was stated that the former could be recognized by the alcohol test before alluded to, and by the mild odor and bland taste which are quite different from that made by heat and pressure."

It appears, therefore, that the solubility of linseed oil in absolute alcohol differs not only according to the nature of the solvent used, but also, in absence of a solvent, whether the oil has been pressed out in the cold, or with the application of heat. Oil extracted with petroleum naphtha, and presumably also cold-pressed oil [though this needs renewed experimentation] is soluble in 5 parts of absolute alcohol. The resinification which occurs in old oil, or in hot-pressed oil, on the other hand diminishes its solubility. What share the bisulphide of carbon, as a solvent, possesses in producing the same effect is not quite clear.

A new method of distinguishing between raw and boiled linseed oil has recently been published by Finkener (*Chem. Zeit.*, 1887, 905). It is as follows:

Shake 12 C.c. of the oil briskly with 6 C.c. of glycerole of acetate of lead (see below) in a test-tube, then set the latter for about three minutes into boiling water. Boiled linseed oil will then appear as a salve-like mass, while raw oil will form two liquid layers, the lower one of which is clear like water. If the raw oil contains 25% of boiled oil, it may by this test be distinguished from pure raw oil. The lead reagent is prepared by dissolving 100 Gm. of crystallized acetate of lead in 150 C.c. of distilled water and 32 Gm. of anhydrous glycerin. The somewhat turbid solution is kept in a well-stoppered bottle. Just previous to use, 5 C.c. of the solution are mixed, in a test-tube, with 1 C.c. of 20% water of ammonia (sp. gr. 0.925), and then mixed with the 12 C.c. of oil. So-called bleached boiled oil has a much lighter yellow color than the raw oil, but behaves under the test like the latter, not like boiled oil. According to the author, this test is preferable to all others so far recommended which are based upon solubility, saponification, or oxidation of raw and boiled linseed oil, respectively.

The Pharmaceutical Society of New South Wales has adopted a novel device for obviating the inconvenience sometimes imposed upon pharmaceutical students in the colony by the necessity of travelling long distances to attend the preliminary examination. In future, whenever the candidate resides more than seventy miles from Sydney, the police magistrate of the district is to be asked whether he will undertake to superintend the examination, and return the examination papers, with the answers, to the Society in Sydney.

CORRESPONDENCE.

Tinctures by Superior Maceration.

To the Editor of The American Druggist.

The following is a practical method for making "resinous tinctures:"

Break up and pass any resins, such as tolu, benzoin, aloes, myrrh, guaiacum, and other resins, through a No. 6 sieve, and suspend it in a coarse, small salt bag (previously washed and dried) by means of a string, in a wide-mouth bottle, so that the menstruum can reach the resins. The heavy solution will go down, and in one or two hours the drugs will be in solution, and does away with the six or seven days' maceration.

Yours respectfully,

HUGO OPPERMANN, Ph.G.

PHILADELPHIA, PA.

We presume that our correspondent was aware that this method is quite old and well known, but that he merely wished to point out the details which will make it useful in preparing small quantities of stock.—*Ed. Am. Dr.*

QUERIES & ANSWERS.

Queries for which answers are desired, must be received by the 5th of the month, and must in every case be accompanied by the name and address of the writer, for the information of the editor, but not for publication.

No. 2,094.—**Gallein and Lacmoid** ("Laboratory").

Gallein has been recommended several years ago already as an exceedingly delicate indicator for acids or alkalies. A small quantity of gallein added to alkaline solutions renders them reddish, while the tint of neutral solutions is pale brown.

Gallein is a name applied to a compound prepared by heating together 2 parts of pyrogallic acid and 1 part of anhydrous phthalic acid for several hours at a temperature of 190° to 200° C. It is prepared without difficulty in open vessels. At first, the hot mixture is a colorless liquid, which gradually assumes a red color, and afterwards becomes viscid and opaque. It is allowed to cool, the fused mass dissolved in hot alcohol, the solution filtered and mixed with water, which causes the separation of the gallein in form of brown flakes, which are purified by repeated solution in alcohol, and precipitation with water. The crude gallein is then heated with glacial acetic acid, whereby it is converted into an acetyl compound, which is purified by repeated crystallization. This is then decomposed with alcoholic potassa, and from the alkaline solution pure gallein is thrown down by hydrochloric acid.

Gallein is so delicate that it will indicate existing traces of alkali in such salts as chloride or acetate of ammonium, acetate, citrate, or tartrate of potassium, carbonate of magnesium, even when phenolphthalein will fail to reveal them.

The hydrates of alkalies (potassa, soda, ammonia, etc.) and of alkaline earths (lime, baryta, etc.) produce a bluish-red color with gallein; and their soluble carbonates a rose-red color. Even bicarbonates—which behave towards phenolphthalein like acids—still produce a faint rose-red tint. Alkaloids, like morphine, brucine, strychnine, cocaine, etc., likewise produce a reddish color.

We have had no extended experience with gallein so far, having only tried it experimentally. Like most new indicators, it will probably turn out to have a certain sphere within which it will be better than any other, while the others will still be useful in other directions.

Lacmoid is an artificial blue coloring matter prepared by heating resorcin with nitrite of sodium and water to a temperature not exceeding 150° C. (see this Journal, 1885, 68). This blue coloring matter undergoes the same changes as litmus in contact with alkalies and acids. It is much more delicate than litmus, and has the additional advantage that, when the coloring matter is fixed upon paper, the latter may be dipped or floated in liquids without the color being washed out from the paper. With lacmoid we have had more experience than with gallein, and can confirm the good reports of other observers. The most thorough study of this indicator has been made by Robert T. Thomson, who published his results in the *Chemical News*, vol. 52, 18.

Lacmoid paper is prepared by saturating unsized paper in a solution of 1 part of lacmoid in 1,000 parts of 45-percent alcohol. If a *blue* paper is wanted, about 5 to 10 drops of solution of potassa are added to the solution. According to E. Bosetti, the commercial lacmoid, before being used as an indicator, should be redissolved in water, the solution precipitated by hydrochloric acid, the precipitated matter washed, dried in the water-bath, then dissolved in alcohol, and the alcoholic solution evaporated. After repeating this process three or four times, the product will be much more sensitive.

No. 2,095.—**Copying Pad** (C. R. S.).

The hectograph mass is a combination of glue or gelatin, water, and glycerin. This combination, as used by the Hectograph Company, is protected by a patent. The proportion of the materials used is about the following:

1 part, by weight, of best glue (Cooper's extra answers well) is covered with cold water, and soaked until it is perfectly soft. The excess of water is then poured off, and the glue allowed to drain a short time. It is then transferred to a kettle, and heated (by a water or steam-bath) until the largest part of the water has been driven off, which may be recognized by the scant vapor given off during the stirring. The mass must be continuously stirred during the heating. Next, 4 parts, by weight, of glycerin are added, and well mixed. The pans in which the mass is to be cast, having been placed upon a perfectly level surface, the liquid mass is dipped out of the kettle, and poured into the pans, best through a conical strainer funnel, to hold back any lumps or foreign substance that may have been in the glue. After the pans are filled, the surface of the still liquid mass, which is usually covered with a sort of foam, caused by escaped air-bubbles, is carefully gone over with the smooth edge of a stiff piece of paper or card-board, so as to take off the scum. The pans are then covered up, and allowed to stand from twelve to twenty-four hours, so that the mass may fully set. The quantity of glycerin, viz., 4 parts, is about right for a moderately warm climate, or for summer, or where the pans are kept in warm rooms. If the pad is to be used in a cold place, or in a cold locality, the glycerin must be increased to 4½ or even 5 parts. But an essential condition of success is to boil or evaporate off all the water possible from the glue before the glycerin is added.

If a pad is spoiled, the mass, unless badly colored by the aniline ink, may be remelted and recast. Frequent repetition of this process, however, renders the mass softer, and finally it will scarcely set at all.

No. 2,096.—**Quillaja** (Supplement to Query No. 2,044, on page 218 of last volume).

We have just come in possession of a rare work, by Molina, entitled: "Saggio sulla Storia Naturale del Chili di Gio. Ignazio Molina." (2nda ediz.) 4to, Bologna, 1810. This work, written in Italian, and dedicated to Eugene Napoleon, was intended by the author to serve as a revised edition of his Natural History of Chili, published in 1782. On page 192 the author writes about Quillaja as follows (we translate from the Italian):

Il Quillay, *Quillaja saponaria gen. nov. Moncæc. Poliandria* [Molina was the first to determine and to name the plant or tree.] An evergreen tree, growing to a height of thirty to forty feet, with straight trunk, branched and covered with a thick, grayish bark; leaves alternate, petiolate, oblongly-ovate and dentate, of a deep-green color, etc., etc. There are, in Chili, two varieties of soap-bark, differing but little in name, and in foliage, namely, the above-described *Quillay*, and another, called *Cullay*, both receiving their names from the Chilian verbs *quillcan* and *cullcan*, which have the meaning "to wash," with a certain shade of difference. The ancient Chilians, though not initiated into scientific principles, were in the habit of making careful distinctions in the names of natural objects, whenever they observed any peculiarity about them. The above two expressive and well distinguished terms have been converted on Spanish soil into *one*, on account of the difficulty caused by the pronunciation of the *u* (in the second); hence both trees have been named Quillay, in spite of their characteristic differences. The true Quillay prefers the coast-region along the Andes; the Cullay the more elevated localities. The infusion of the bark of the Cullay renders linen fabrics somewhat yellow (as already observed by Frezier), while this is not the case when Quillay is used. I believe that the Madrid botanists have formed their genus *Smegmadermos* in the section Polygamia Dicœcia, upon the Cullay, as being more common than the Quillay, etc.

We quote the above, not only to explain the meaning of the original term, but also to show that the originator of the botanical term *Quillaja*, viz., Molina, spelled the word with a *j* and not with an *i*.

No. 2,097.—**Solution of Nitroglycerin. Its Assay and Mode of Keeping** (Dr. A. E. J.—and S. J. & Co.).

The only kind of solution of nitroglycerin which is used medicinally is a *one* (1) *per cent* solution in alcohol. This is, of course, meant by weight. Taking into consideration the specific gravity of nitroglycerin, which is 1.600 at 15° C. (59° F.), and that of alcohol, which is about 0.820, it will be found, on calculation, that the above proportions (by weight) are equivalent to about the following proportions by measure, provided there is no change of volume on mixing the two liquids:

Nitroglycerin.....	1 volume.
Alcohol.....	193 volumes.

Consequently, about 194 minims will be equivalent to 1 minim (or to 0.0976 Gm., or to 1.5 grains) of nitroglycerin. And 1 minim of the solution will contain 0.00515 Gm., or 0.079 grains, or $\frac{1}{194}$ minim of nitroglycerin.

Regarding the best method of assaying an alcoholic solution of nitroglycerin it may be stated here, that the National Formulary Committee has determined to include "Spiritus Glonoini" in the list of articles to be inserted, and has had the benefit of the advice of Professor Charles E. Munroe, U. S. Navy, at the Torpedo Station at Newport, R. I. While there are several well-known methods for testing or estimating nitroglycerin, it was deemed inexpedient to adopt any which require the previous isolation of nitroglycerin in a pure state. The experiments, however, in this direction are not yet concluded, and the results cannot be published by us at the present time.

Regarding the *mode of keeping* solutions of nitroglycerin, it should be made an invariable rule, *never* to keep the solution in vessels in which are liable to be fractured or broken. *Glass* or *stone-ware* vessels should never be used; least of all, glass. Concerning this matter, attention is called to an editorial, embodying some important information which will be of interest to many of our readers.

No. 2,098.—**Bird Lime, Brumata Lime, etc.** (St. Louis).

These terms are used in English, but are sometimes misunderstood. The second word "Lime" is *not* the English word, equivalent to oxide of calcium, but is a German word, meaning *glue* in English. Bird-lime, therefore, stands for "bird-glue," that is, some preparation which is sufficiently adhesive to cause small birds, after having alighted upon it, to become so entangled in it that they may be easily caught. A preparation of this kind used to be made at one time from a decoction of *Viscum aucuparium*. But at present, artificial mixtures are usually made, chiefly composed of turpentine (that is, the natural exudation of pines), rosin and other substances. "Brumata-Lime," standing for "brumata-glue," is a term as yet but little used here, but deserves to be better known. Many of our readers will have seen the peculiar yellow hairy caterpillar, with a black or brown line along the back, which infests many of our ornamental and fruit trees and causes their destruction by consuming the foliage. The "brumata-lime" is intended to prevent their propagation. It was first proposed by Mr. Becker, a school teacher at Jüterbogk (Germany), and received its name from the *Cheimatobia* (or *Acidalia*) *brumata*, the butterfly, of which the caterpillar has been mentioned above. The female of this insect cannot fly, while the males are able to do so and settle upon the tree. The females are compelled to crawl up along the trunk, and to prevent this, a ring of "brumata-lime" is applied. This is prepared by mixing 5 parts of rape oil with 1 part of lard, boiling the mixture until it thickens, then adding 1 part each of turpentine and rosin. Hager recommends to melt together 250 parts of black pitch, 100 of turpentine, 100 of paraffin, oil and 100 of crude rape oil, then to allow the mass to become partly cool, and to add 5 parts powdered benzoin, 50 of vaseline [petrolatum], 2 each of carbolic and salicylic acids, and 10 of gurjun balsam.

The best time to apply the mass is about the beginning of October, or even earlier. It should be well looked after, and renewed from time to time.

No. 2,099.—**Recovery of Platinum from Laboratory Residues.**

The most systematic and carefully planned method is the following, proposed by P. Wagner and recommended by Boeckmann (*Chem.-tech. Untersuchungsmethoden*, 2d ed., I., 121).

The platinum residues are best preserved in two separate vessels, one of which is for the filters containing the potassio-platinic chloride, the other being intended for the alcoholic wash-liquids, containing platinic chloride in combination with chlorides of sodium, magnesium, barium, etc.

This liquid is operated on first. It is mixed with enough of a saturated aqueous solution of pure chloride of potassium to precipitate all the platinum. After 24 hours' standing, the supernatant liquid is siphoned off, and the residue is then washed into a porcelain capsule with the aid of some of the siphoned-off alcohol. The precipitate, which can be detached from the filters contained in the other vessel, is added to the contents of the capsule, the empty filters boiled several times with water in a second capsule, the liquids being added to the first. Next enough carbonate of sodium is added to produce a strongly alkaline reaction, the whole stirred up repeatedly, and allowed to stand on the steam-bath for about ten hours. Platinum black will then be deposited in a compact state, and the supernatant liquid will have only a faint yellow tint, due to the presence of organic substances (a lemon-yellow color would show that undecomposed platinic chloride is still present). The liquid is now poured off and allowed to run through a filter. The platinum black is boiled with water, allowed to deposit, and the liquid poured off. This boiling and washing is repeated once with pure hydrochloric acid and twice with distilled water. Finally, the platinum black is transferred to a filter, again washed and dried at the ordinary in-door temperature. A higher heat must be avoided, as the filter would be burnt up by the metal.

The platinum black thus purified is dissolved in aqua regia prepared from 5 parts of hydrochloric and 1 part of nitric acid. The best way to proceed is as follows: Put the hydrochloric acid in a wash-bottle (having a jet), and wash the platinum black from the filter into a capacious porcelain capsule, which is then gently warmed on the water-bath. Now add the nitric acid *in drops*. In one hour, solution will have been effected. Allow the solution to cool somewhat, pass it through Swedish filtering paper, and evaporate the filtrate in a porcelain capsule, upon the water-bath, until a small portion removed at the end of a glass rod begins to solidify. A very small quantity of hydrochloric acid is now carefully added, and the excess evaporated, several times in succession, until all nitric acid has been dissipated.

No. 2,100.—**Ownership of Prescriptions** (R. N. G.).

In order to obtain a list of decisions of Courts regarding the ownership of prescriptions, the most promising method would be to consult the librarian of a good law-library such as is, no doubt, existing in your city. A library attached to the U. S. Courts, or to the more important State Courts, usually possesses the published law reports of all the States of the Union, and it is then only a question of time to go through the indexes and look up the references. We cannot relieve you of this part of the work.

So far as we know, the ownership of a physician's prescription has been brought before the courts, heretofore, only in a one-sided way, and has not been argued from the standpoint of special agreement or contract. It is usually supposed that when a patient calls upon a physician for advice, the advice constitutes the commodity which the physician has to sell for the time being, and that, if he writes a precription and delivers it to the patient, receiving his fee, the commercial transaction is completed. In other words, it is supposed that the advice, including the prescription, are tantamount to a bona-fide sale on the part of the physician, and to a bona-fide purchase on the part of the patient, so that the latter may be regarded as the owner in fee simple of the prescription. But a sale or purchase may be regarded, or rather, should be regarded, as a form of contract, entailing certain obligations upon both parties. When there are *no* conditions surrounding the exchange of the commodities, except the act of handing over the consideration, the transaction is absolutely completed and the contract fulfilled, as soon as the consideration is paid. But if the sale is made under certain conditions, accepted by the purchaser, the case assumes an entirely different aspect. We hold that if a physician expressly writes upon a prescription: "This prescription is intended for a special case and occasion and is not to be repeated"—or words to this effect—and if the client accepts the prescription with this condition, then the latter is bound to abide by the condition. We believe, if a case of this kind were properly argued before the Courts, it would be decided as we have outlined. But such a decision would hardly be of much practical value, because all that would be needed to evade the condition would be for the client to copy the prescription with omission of the prescriber's name and all details which might show that it was intended for a special case and occasion. Since any one may combine medicines in any way, manner, or shape, and several prescribers often happen to combine the same ingredients in the same proportions, it would be impossible for the original prescriber to identify—in a legal sense—his own prescription which he had given or sold to his patient conditionally.

Practically, therefore, even the acknowledged or assumed right of the physician to limit the use of any of his prescriptions to a particular case or time, could be easily circumvented, unless laws should be enacted which would clearly define the rights of prescriber and client.

No. 2,101.—**Detection of Mineral Wax in Beeswax** (San Francisco).

Both the bleached and the unbleached, or yellow wax, are frequently adulterated with certain kinds of paraffin, or the latter are substituted for it altogether. The usual adulterant for yellow wax is the yellow ceresin obtained from fossil wax or ozokerite. White wax is often adulterated with white ceresin, or with some variety of white paraffin obtained from the petroleum residues. The recognition of these adulterants is comparatively easy when they are present in considerable proportion. But when they are small in quantity, and perhaps other adulterants are added which partly neutralize the anomalies introduced by the former, the detection of the adulteration is not so easy.

The test for paraffin given in the U. S. Pharm., under *Cera Flava*, by heating the wax with sulphuric acid, which had been relied upon by many analysts before it was introduced into the pharmacopœia, is now regarded as untrustworthy by the most competent judges.

Among the less circumstantial methods of testing, those of Buchner and of Hager deserve mention here:

1. *Buchner's Method.*—Boil a sample of the suspected wax with a concentrated alcoholic solution of potassa (1 part of potassa and 2½ to 3 parts of 90-per-cent alcohol) for a few minutes in a wide test-tube. Transfer the liquid to a narrow test-tube, and place this for some time in a water-bath. If the wax is pure, the solution remains clear. If it contains ceresin or paraffin, the hydrocarbons float, as an oily layer, on the surface of the potassa solution, which is usually colored. If the separation into layers should be imperfect or sluggish, it may be brought about at once, by adding a little alcohol and again warming on the water-bath.

2. *Hager's Method.*—Heat 2 Gm. of the wax with 5 C.c. of a solution of carbonate of sodium, until the wax melts, then shake thoroughly, and gradually add 6 C.c. of benzol, frequently shaken. This will produce an emulsion, which should be warmed during one hour upon the water-bath to 50° C. (122° F.), and is then set aside to cool at the ordinary temperature. If the wax is pure, the upper layer is liquid and scarely turbid. If, however, paraffin or ceresin were present, the upper layer is more or less solid, turbid, or opaque and white.

A method which requires more time, but which generally yields more definite information, even quantitatively, is:

3. *Hübl's Method.*—Wax consists mainly of *cerotic acid* and of *myricin*. The latter is a so-called compound ether, namely, the palmitate of myricyl. Hübl's method is based on two considerations, namely, *first*, the number of milligrammes of potassa (determined volumetrically) required to saturate the free cerotic acid, and *second*—after the cerotic acid has been neutralized—the number of milligrammes of potassa required to saponify the myricin, that is, to convert it into palmitate of potassium and myricyl alcohol.

$$\underset{\text{Myricyl palmitate (or myricin)}}{C_{30}H_{61}.C_{16}H_{31}O_2} + \underset{\text{potassa}}{KOH} = \underset{\text{myricyl alcohol}}{C_{30}H_{61}.OH} + \underset{\text{potassium palmitate}}{KC_{16}H_{31}O_2}$$

(Myricyl is also sometimes called mellisyl.) The proportion of free cerotic acid and myricin in wax is as 1 of the former to 6 of the latter.

The execution of the method is as follows:

Three to 4 Gm. of the wax are warmed with about 20 C.c. of 95% alcohol until the wax is melted, the mixture is well shaken, if necessary warmed again to keep it liquid, and then titrated with ½ normal potassa (containing 26 Gm. of KHO in the liter), phenolphthalein being used as indicator. As soon as the cerotic acid is neutralized, as shown by the appearance of a rose-red tint, about 20 C.c. more of the same volumetric solution are added, the quantity being exactly noted, and the mixture warmed on a water-bath for about 45 minutes. Finally, the excess of alkali, not required to combine with the palmitic acid, is determined by titrating with ½ normal acid.

The number of C.c. of the volumetric alkaline solution first consumed, when transcalculated into milligrammes of potassa, is called by Hübl "acid-number." And the number of milligrammes required to combine exactly with the palmitic acid, is called the "ether-number."

Now it has been found, that *for wax*, the "acid-number" is usually between 19 and 21, mostly 20. The "ether number" is usually between 73 and 76, mostly 75.

The respectively lower and higher numbers usually occur together, hence the proportion between the "acid-number" and "ether-number" is generally very uniform, varying only by a small fraction. If the "acid number" is assumed to be 1, then the "ether-number" will be between 3.6 and 3.8, and is generally 3.7.

Now here it should be noticed that the theoretical quantity of potassa required for saponifying pure wax consisting of pure cerotic acid and myricin is less than that actually found necessary. Wax therefore must contain small quantities of other saponifiable constitutents which are not known. The "saponification-number"—that is, the number of milligrammes of potassa (KHO) required to combine with *all* the acid bodies in wax—varies between 93 and 96.

Comparing with these figures, those obtained under the same circumstances with other fatty or wax-like substances, liable to be used as adulterants of or substitutes for beeswax we find that the figures for *wax* are very characteristic, as the following table will show:

	I. "Acid-number."	II. "Ether-number."	III. Total Saponification-number.	IV. Proportion of II. to I.*
Japan Wax	20	200	220	10
Carnauba wax	4	75	79	19
Tallow	4	176	180	44
Stearic acid	195	0	195	0
Resin	110	1.6	112	0.015
Ceresin, or Paraffin	0	0	0	0
Beeswax, yellow	20	75	95	3.75

*Supposing the figures in column I. were reduced to "1." The figures in column IV. may be termed "proportional numbers."

If the "saponification-number" is found to be below 92, and the "proportional number" is that of pure wax, then ceresin or paraffin are present. If the "proportional number" is greater than 3.8, the possible adulterants are Japan wax, Carnauba wax, or tallow. But Japan wax is excluded if the "acid-number" is less than 20. When the "proportional number" is smaller than 3.6, the adulterant is stearic acid or resin.

Supposing a sample of wax tested in this manner has been shown to contain some ceresin or paraffin, the quantity of the adulterant may be estimated, approximately, in the following manner. Considering 95 to be the mean saponification number of pure wax, and denoting by k the saponification number of the sample under consideration (which number must have been considerably smaller than that for pure wax), we may calculate the percentage (x) of paraffin or ceresin by the formula:

$$x = 100 - \frac{100\,k}{95}$$

This equation is derived from the proportion

$$95 : 100 = (85 - k) : x$$

which may be read: *As* 95, or the total saponification number of pure wax, is to 100, that is to 100 parts of pure wax to which the number 95 belongs, so is the loss which the total saponification number has suffered, to the number of parts of ceresin or paraffin present. Of course, with a pure wax, k becomes 95. Hence the second portion of the equation becomes:

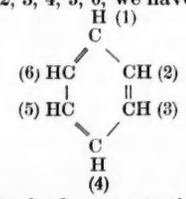
$$95 : 100 = 95 - 95 : x$$
$$95 : 100 = 0 : x$$
$$x = 0$$

that is, there would be none of the adulterant present.

No. 2,102.—**Sulphanilic Acid** (W. L. R.—M. H.).

Regarding this compound, which has been mentioned repeatedly in our pages—for instance, as a reagent, on page 231 of our last volume; as an almost instantaneous cure for iodism, page 149 of our volume for 1886, etc.—we have had several inquiries. The following note will give the essential details.

Sulphanilic acid is, properly speaking, "para-amidobenzol-sulphonic acid." Representing benzol by the usual diagram (which must only be regarded as an ideal reduction to the most simple form of a solid molecule of the substance), and distinguishing the several positions by the figures 1, 2, 3, 4, 5, 6, we have:



Any one of the hydrogens in this compound may be replaced by a monad element or group. If only *one* at a time is thus replaced, it is immaterial which of them is supposed to have been affected. If, however, *more than one* is replaced *at the same time*, then the properties of the products depend upon the relative position of the replacing bodies. Supposing *two* hydrogens are thus replaced. If they are contiguous, (1) and (2), or (2) and (3), or (3) and (4), etc., then the product receives the prefix *ortho-* in case it is necessary to distinguish it from others. If, however, the substitution takes places at (1) and (3), or (2) and (4), or (3) and (5), etc., with an intermediate intact member, the product receives the prefix *meta*. And if two members are passed over, that is, if the substitution takes places at (1) and (4), or (2) and (5), etc., the product receives the prefix *para*.

From benzol, C_6H_6, is derived nitrobenzol, $C_6H_5.NO_2$. This NO_2 may be supposed to be substituted for any one of the hydrogens in the benzol ring.

By treatment with sulphuric acid, under certain conditions, many organic compounds, particularly of the aromatic series, are converted into so-called sulphonic acids, that is, acids produced by the substitution of HSO_3 for one hydrogen. Thus $C_6H_5.HSO_3$ is benzol-sulphonic acid. Now, as nitrobenzol already has the group NO_2 in the place of *one* hydrogen, it follows that, if a sulphonic acid is formed from this, the group HSO_3 will have to replace a *second* hydrogen. And now it depends which hydrogen is thus replaced. According to what has been said above, it will be readily understood that there are three nitrobenzol-sulphonic acids possible, the formulæ being as follows (the numbers in parenthesis indicate the position of the hydrogens replaced according to the scheme above given):

1. *Ortho*-nitrobenzol-sulphonic acid:

$$C_6H_4 \begin{cases} (1)NO_2 \\ (2)HSO_3 \end{cases}$$

In place of (1) and (2), the position may be imagined to be (2) and (3), or (3) and (4), etc., as explained above.

2. *Meta*-nitrobenzol-sulphonic acid:

$$C_6H_4 \begin{cases} (1)NO_2 \\ (3)HSO_3 \end{cases}$$

3. *Para*-nitrobenzol-sulphonic acid:

$$C_6H_4\begin{cases}(1)NO_2\\(4)HSO_3\end{cases}$$

When nitrobenzol is treated with fuming sulphuric acid, all three of the above derivatives are formed at the same time, but not in equal quantities. Usually, the *meta*-acid is produced in largest proportion, somewhere near ninety per cent.

If now, by some process, the group NO_2 is replaced by the group NH_2 (amidogen), the resulting product receives the prefix *amido*, in place of *nitro*. The process by which this is best accomplished in the present case is to convert any of the above acids, previously separated, into ammonium salts, adding a large excess of strong ammonia, and conducting a current of hydrosulphuric acid through the solution. The product will then be the ammonium salt of the amido-benzol-sulphonic acid. By decomposing this with a mineral acid, the organic acid is precipitated.

When this process is applied to the third of the above-named sulphonic acids (the "*para*"), the result will finally be:

$$C_6H_4\begin{cases}(1)NH_2\\(4)HSO_3\end{cases}$$

and this is the compound which is better known as *sulphanilic acid*. It was discovered and known long before its exact chemical constitution was understood. Practically, it is prepared in a very simple manner, the constituents used having given it its original name.

1 part of aniline and 3 parts of concentrated sulphuric acid are heated to a temperature of 180–190° C. (356–374° F.), under an upright condenser, until no more aniline is present as such. On pouring the mass into water, sulphanilic acid separates.

Sulphanilic acid is soluble in 112 parts of water at 15° C. (59° F.), more easily in boiling water. It is insoluble in ether or alcohol. The commercial acid usually has a gray or brownish color. For analytical or medical purposes, it should be white or nearly so, and should yield a clear and at least nearly colorless solution in water containing alkali.

BIBLIOGRAPHY.

ORGANIC ANALYLIS: A Manual of the Descriptive and Analytical Chemistry of certain Carbon Compounds in Common Use. For the Qualitative and Quantitative Analysis of Organic Materials, Commercial and Pharmaceutical Assays; the Estimation of Impurities under Authorized Standards; Forensic Examination of Poisons; and Elementary Organic Analysis. By ALBERT B. PRESCOTT, PH.D., M.D., Director of the Chem. Labor. in the University of Mich., etc. 8vo. New York: (D. Van Nostrand), 1887, pp. vi.; 533.

THIS work had been announced as being in preparation several years ago; but the last few years have been so fruitful in new discoveries or improvements in methods of testing that we fully realize the difficulty which the author must have encountered in choosing the proper time when the text of any one chapter could be considered as resonably complete up to that moment.

On examining the work, it will at once be seen that the contents are a series of more or less detailed monographs, in alphabetical order. Some of these are treated with most particular care and fulness, having evidently formed the subjects of special or favorite investigations of the author. Neutral principles, organic acids, and alkaloids are generally treated in their respective alphabetical order, though certain groups are also treated collectively, such as Cinchona, Opium, Strychnos, etc., alkaloids. Under the chapter entitled "Alkaloids," general processes for isolating these bodies and recognizing their alkaloidal nature are given. A systematic scheme for separating alkaloids and neutral principles, based upon that of Dragendorff, is given by the author on p. 452, but we could have wished that this were more in detail, though we fully realize the fact that this would have taken considerable space, and, perhaps, been only of limited practical use, outside of a systematic work treating specially of plant analysis. The absence of a more detailed scheme of separation in the case of alkaloids, however, as well as in the case of organic acids (though minor schemes, for the separation of a small number of acids likely to occur together, are here and there inserted, *f. i.*, p. 336) is made up by very detailed methods of separation, given under the head of each separate article.

Too much praise cannot be bestowed upon the treatment of the difficult chapters of Cinchona and Opium Alkaloids, which include everything of value that had been published up to the time of the respective texts being printed, so far as we can judge from the references. A suggestion for an improvement to be introduced into works of reference like the present, which we desire to make, will be found among the editorials in this number, as we deem it of sufficient importance to draw special attention to it. The chapter on Fats and Oils is also very complete, though we think it might have been more practically useful by describing in detail, and in *one* connected paragraph, the best methods of separating and estimating certain bodies often fraudulently combined, such as ceresin, paraffin, etc., in beeswax. The schemes of plant analysis given are those arranged by Parsons and by Dragendorff, which cover the ground quite effectively, so far as our present knowledge of plant constituents goes. Another very instructive chapter is that on Elementary Analysis, though the execution and application of Kjeldahl's method of determining nitrogen has undergone various modifications and improvements since the author's text was completed.

Throughout the work we find a large amount of information, which is now first presented by the author, mostly based upon his own experience and experiments.

Great care has evidently been bestowed upon the editing of the work, as we have, so far, not encountered any wrong figures, and but few misprints. On page 181, foot-note, however, we miss a reference to the important work of Schultz, "Die Chemie des Steinkohlentheers," 2 vols., Braunschweig, 1882 (new edition, I., 1886). On page 177, what is given as Maclagan's (this is the proper spelling) test, is not that now recognized as such. This was published in the AM. DRUGG., 1887, page 22, but perhaps too late to be included by the author. We notice that the latter uses several unusual spellings, thus "midriatic," page 339 sqq.; "mioporoides," page 340; instead of mydriatic, etc.

Prof. Prescott's work, embodying the fruits and results of many years' study and practice on the wide field of organic analysis, constitutes an important addition to our standard and authoritative works of reference, and should be in the library of every member of the chemical and pharmaceutical professions.

ELEMENTS OF MODERN CHEMISTRY. By ADOLPHE WURTZ (Senator), etc. Third Amer. Edit. Translated and edited, with the Approbation of the Author, etc. By W. H. Greene, M.D., Prof. of Chemistry in the Central High School, Philadelphia, etc. 8vo. J. B. Lippincott Co. 1887.

WE need not add anything to our former favorable notice of this work, except to say that the text appears to have been carefully revised (with one exception), and that the work is highly to be recommended as a text-book for schools. It has one weak point, however, in our judgment, though this will not make itself felt in the circles where it will be most used. We refer to the chapter on alkaloids, which is antiquated and not in accordance with our present state of knowledge. Of cinchona alkaloids, only quinine and cinchonine are treated in detail. At the present day, cinchonidine as well as quinidine are of considerable importance. The process given for the preparation of quinine has long been abandoned by all makers for a more economical one. We would suggest that this chapter be entirely remodelled, at least in a succeeding American edition, even though Prof. Wurtz may not deem this necessary for another French issue.

MANUAL OF PHARMACY AND PHARMACEUTICAL CHEMISTRY. Designed especially for the Use of the Pharmaceutical Student and for Pharmacists in General. By CHAS. F. HEEBNER, Ph.G. [New York, class '81]; Instructor in Pharmacy at the College of Pharmacy of the City of New York. 8vo. New York (Publ. by the author), 1887.

THIS is a book which has grown upon the author during his personal intercourse, as one of the quiz-masters or instructors with many successive classes of the College of Pharmacy. While a lecturer, *ex cathedra*, has but little chance of knowing what his hearers have learned from his lectures until an examination is held, the quiz-instructor, on the other hand, has the advantage of being constantly able to feel the pulse of the classes, as it were, so far as their comprehension of the subjects taught in the lectures is concerned. He is thereby enabled to know which matters are more slowly and with more difficulty mastered by the students, and he can arrange his drill to suit the circumstances. Experience thus gained renders quiz-instruction particularly valuable. Even a casual glance through Mr. Heebner's book will reveal its exceedingly useful character.

Of course, it can give in many cases only the leading features or the skeleton of the information which it is desirable that the student should possess. Yet, with such a ground work, well-digested, the acquisition of further knowledge is an easy matter. The book contains not only all that is essential to a knowledge of the branches it relates to, but it also embraces a large amount of information, useful and practical, which is even not found in the larger treatises, as, for instance, the method of averaging percentage on pages 32–33. (On page 33, last line, read 23.2 for 2.32).

We have so far, at our first cursory examination, observed but few misprints, and no errors of importance.

AN UNWELCOME DOSE.